# Coal Age

STABILITY FOR COAL . . . . p 62

# 6000 TONS DAILY unloaded automatically at Leatherwood

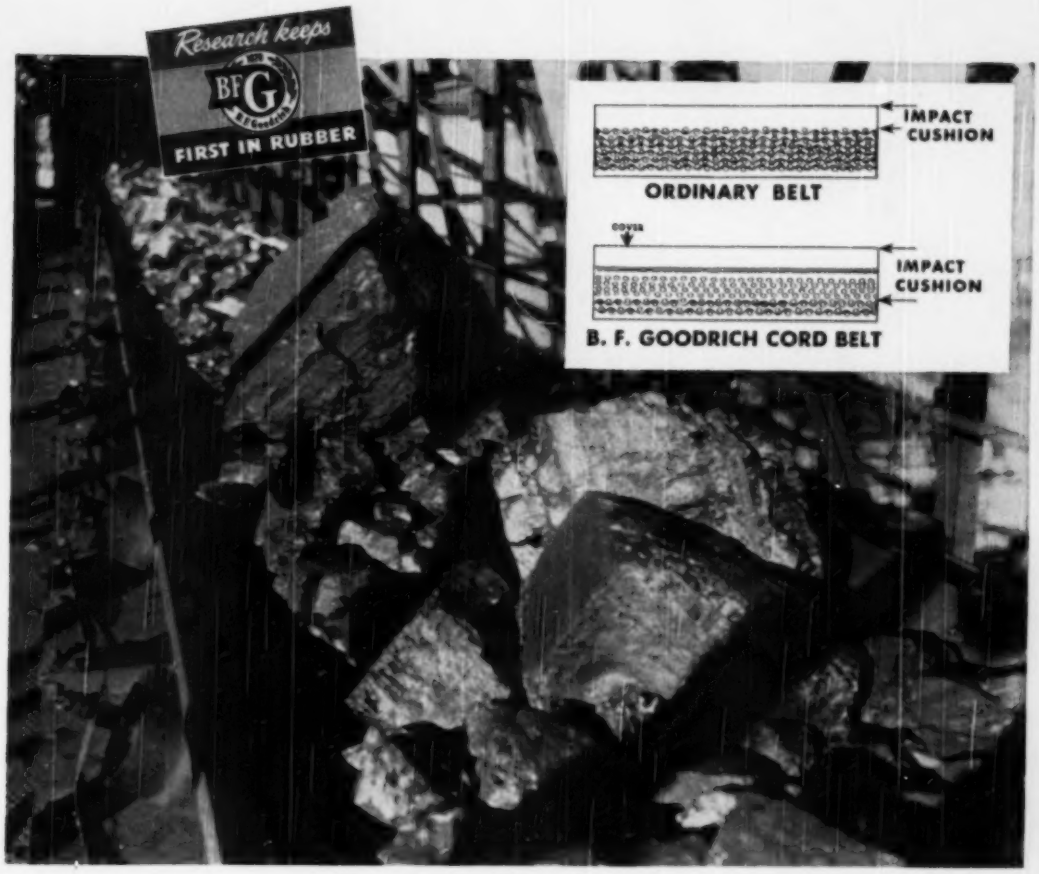
**Started in 1944, with a handful of A.C.F. Mine Cars, transferred from Bonny Blue Mine, Blue Diamond's Leatherwood Mine now uses over 300 new automatic-dumping A.C.F. Drop Bottom Mine Cars to handle its huge output.**

As the above photograph shows, all coal at Leatherwood is unloaded automatically. The motorman merely hauls the trip of A.C.F. Drop Bottom Cars over the dumping point at normal speed. Each drop-bottom door trips-and-unloads, latches-and-locks as the car moves along, without any attention or control from the operator. When the last car has cleared the dumping point, the trip is ready to return to the face without a minute's delay. Leatherwood's future plans are another reason why A.C.F. Drop Bottom Mine Cars were chosen. Eventually, 8000 tons of coal will be unloaded daily! The present 150-ton storage bin is to be replaced by a permanent bin holding 2500 tons. This will permit railroad-loading capacity of 750 tons *per hour!* Obviously, only *'constant haulage'* mine cars could supply this much coal efficiently.

# a.c.f. MINE CARS

*for Constant Haulage*

Our sales representative will gladly give you all possible help in scientifically planning a new or improved coal-hauling system. American Car and Foundry Company, New York · Chicago · St. Louis · Cleveland Philadelphia · Pittsburgh · Berwick, Pa. · Washington Huntington, W. Va. · San Francisco




# B. F. Goodrich cord conveyor belt

## *Gives 2 to 6 times greater impact resistance, troughs better, lasts longer*

EACH lengthwise cord in a B.F. Goodrich cord belt is completely surrounded by rubber—no cross threads tie them together. These parallel cords are completely insulated from one another by rubber, free to "give" lengthwise and crosswise when an impact occurs. Thus the rubber can distort temporarily to distribute and absorb shocks that would damage a stiff, unyielding carcass. This augmented impact cushion means better belt service, longer belt life.

***Cord belts trough better***—Cord belts carry the load with less belt damage, less material "spill". Even thick, narrow cord belts trough naturally. And because they trough better, cord belts keep centered on the idlers, sustain less damage, require less maintenance. Longer centers, higher lifts can be used. Creasing action between idlers (as in a fabric-type belt) is eliminated.

***Cord belts last longer, reduce costs***—The better impact cushion of cord construction resists cuts and gouges. A transverse cord "breaker" floated above and across the main cord section helps cushion impact, keeps the cover from stretching beyond elastic limits, and provides better adhesion between cover and carcass. With each cord completely sealed in rubber, this belt resists the effects of acid materials, moisture, mildew.

***Cord belts for tough jobs***—If your belts must take severe impact on loading or "over the idlers", cutting and gouging at the loading chute, exposure to moisture and acid materials, heavy loads with long centers and high lifts, you need B.F.Goodrich cord belts. Your local distributor will show you how they can save you money. *The B.F.Goodrich Company, Industrial and General Products Division, Akron, Ohio.*

**B.F.Goodrich**
**RUBBER FOR INDUSTRY**

# The Champion

## ...ON THE TIGHTROPE

TIGHTROPE walkers are starred in every circus, but the undisputed all-time Champion for sheer nerve was (and still is) the phenomenal Charles Blondin, born in Lyon, France, in 1824. On June 30, 1859, before an immense crowd, he first crossed Niagara Falls on a swaying tightrope, in 3 minutes. On July 4 he crossed blindfolded, trundling a wheelbarrow! Then on August 19, blindfolded, he crossed Niagara again, this time carrying a man on his back (the name of *that* hero has been forgotten). He crossed the gulf again on stilts in the presence of the Prince of Wales . . . and as if that weren't enough, he carried a stove to the center of a tightrope and cooked an omelet on it! Blondin continued to astonish the world for many years, his final performance being in Belfast, Ireland, at the ripe age of 72. He was supreme in his field.

**HULBURT OIL & GREASE COMPANY, PHILADELPHIA, PA.**

*Specialists in Coal Mine Lubrication*

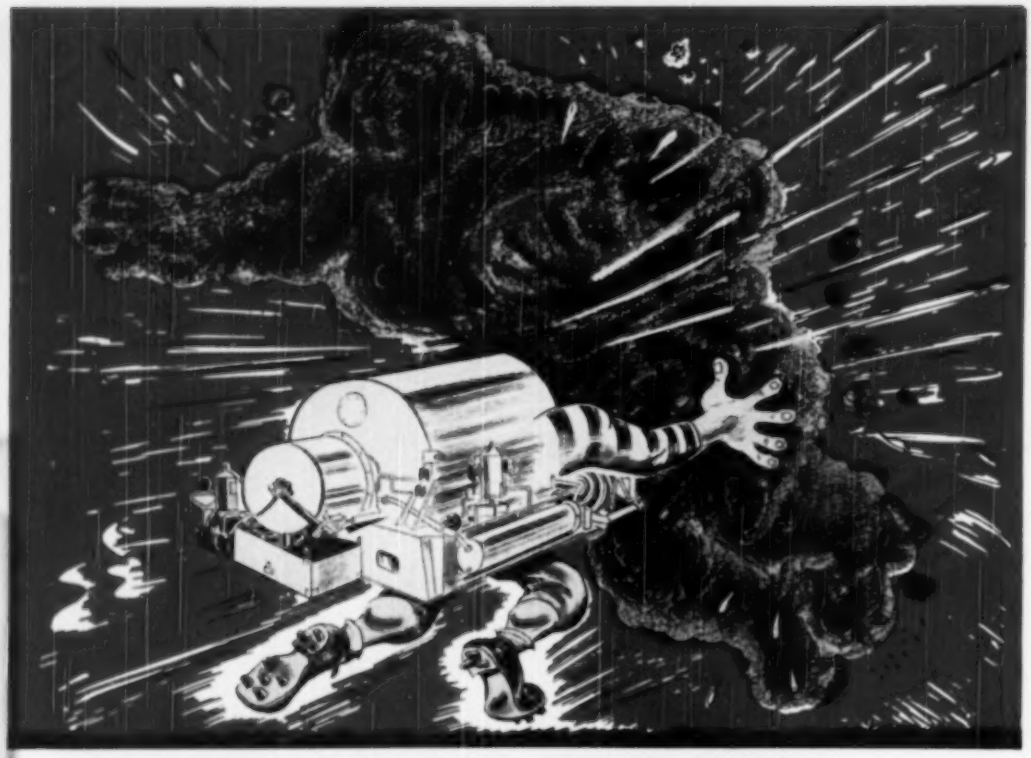
# The Champion

## ...IN COAL MINE LUBRICATION

# Hulburt Quality GREASE

## "The Champion"

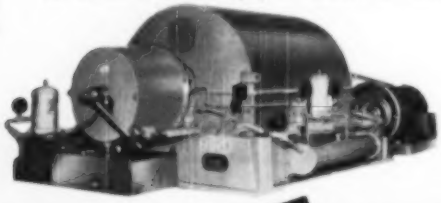
**There are lubricants and lubricants . . . but lots of experienced Coal Mine Operators, who've been up-in-the-air because of lubrication troubles will tell you HULBURT QUALITY GREASE is the undisputed all-time Champion when it comes to making Coal Mining Machinery run smoothly. You're taking no chances when you let HULBURT carry your load of lubrication troubles. The balance of the evidence proves that this specialized product, made to do its one job supremely well, does it every time, all the time. Let a Hulburt Lubrication Engineer (who won't work blindfolded, but with knowledge gained right down in your mine) take your lubrication problems on his shoulders, and you'll reach your goal safely!**



# BETTER TACKLE THAT FINE COAL PROBLEM RIGHT *NOW!*

Every day you put off the proper preparation of your minus 3/8" sizes, you're throwing away money.

If drying difficulties have seemed to you to stand in the way you need hesitate no longer. The BIRD COAL FILTER is doing the job with complete success. It effects a closed water system. It delivers the fine coal well blended and dry enough for direct loading. It operates continuously for long periods without maintenance shutdowns.



Why not get the facts? Ask us to mail you the Bird Coal Filter Bulletin.

**BIRD MACHINE COMPANY**
**South Walpole, Massachusetts**

**The BIRD** *Continuous Centrifugal* **COAL FILTER**

### THIS MONTH'S COVER

**HIGH MINING ACTIVITY** can be expected as stockpiles are built back to the levels shown at this Lake dock of the Pittsburgh Consolidation Coal Co. To simplify split orders, much of this coal is shipped via box cars, here lined up for loading. One of the iron-ore loading docks also can be seen in the background. *Photo courtesy P.C.C. News.*

### COMING YOUR WAY

**THERE'S MANY A WAY** to cut costs and improve mining efficiency, as this month's contents at the right indicate. Every month COAL AGE seeks to bring you many such useful ideas—and future issues will be no exception. Here are a few it will pay you to watch for.

- **How Princess Elkhorn** promoted safety by polling employees for their ideas and putting their interest and recommendations to work.
- **Air cleaning** that sells steam-coal markets and improves mine output at the Trotter Coal Co.
- **Hydraulics** in modern mining—how hydraulic equipment can be applied and what it can do for you.
- **Planning and developing a major** new anthracite colliery in steeply pitching coal—methods and equipment for high efficiency.
- **How to calculate air-shaft size** for lowest ventilating cost—procedure, formulas and results.

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TEXACO LUBRICANTS

MINE locomotives have numerous grease-lubricated ball and roller bearings, all of which run better and last longer when packed with *Texaco Regal Starfak*. Here and in the anti-friction bearings of cutters, loaders, shakers, motors and other equipment, the premium quality of *Texaco Regal Starfak* pays off handsomely in longer bearing life and lower maintenance costs.

An extra processing step gives *Texaco Regal Starfak* exceptionally high resistance to oxidation and gum formation, to separation and leakage. It stands up under severe conditions, and within a wide temperature range reduces power-wasting "drag." *Texaco Regal Starfak* stays *in* the bearings, giving full protection for longer periods, making fewer applications necessary.

In low-speed, heavy-duty anti-friction bearings, use *Texaco Marfak*. It will give full protection for longer-than-ordinary periods . . . prolong bearing life . . . reduce maintenance costs.

Texaco has cost-saving lubricants for every machine in your mine. Let a Texaco Lubrication Engineer help you select the proper ones. Just call the nearest of the more than 2,000 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

Photo courtesy Goodman Mfg. Co.

# For the Coal Mining Industry

# "C" TOURNAPULL.

## gives you year-round EARNINGS

C Tournapull prime mover . . . 190 h.p. diesel . . . 5 speeds to 30 m.p.h. . . . 21.00 x 25 low-pressure tires . . . power steer, 90° turns . . . electric controls . . . uses 4-wheel multi-disc air brakes, braking surface 4,176 sq. in.

No other dirtmover can offer you the opportunities for steady earnings that come to you with C Tournapull. Behind this high-speed, rubber-tired prime mover you can interchange at will six different types of equipment to keep working and earning all year-round. Each fits specific needs for earning extra profits on stripping, hauling, lifting and materials-handling around your property.

Note that each of these auxiliary interchangeable units is a simple, rugged, specialized tool for doing certain types of work at a far lower cost than is customary with general purpose equipment. When you buy any one combination with the C Tournapull prime mover you get with it an extra value in insurance of steady and profitable earnings, because of its great versatility of application with other hauled units.

Tournapull, Tournatrailer, Tournapower Trademark Reg. U. S. Pat. Off. Tournatractor, Tournahopper Trademarks Cl27 H.

LeT

To: **R. G. LeTOURNEAU, INC., Peoria, Illinois**

Please send information on C Tournapull prime mover for work with:

☐ Scraper ☐ Rear-dump hauler ☐ Bottom-dump hauler ☐ Flat bed ☐ Crane ☐ Concrete Mixer

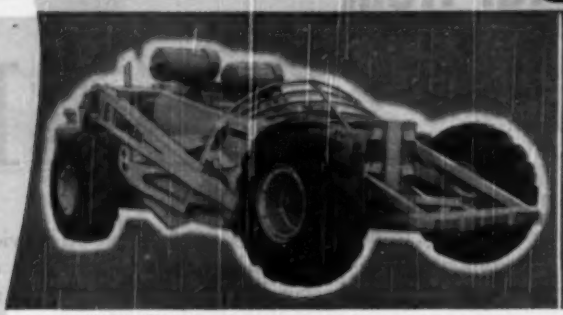
NAME ..... TITLE .....

COMPANY ..... TYPE OF OPERATION .....

STREET ..... CITY, STATE .....

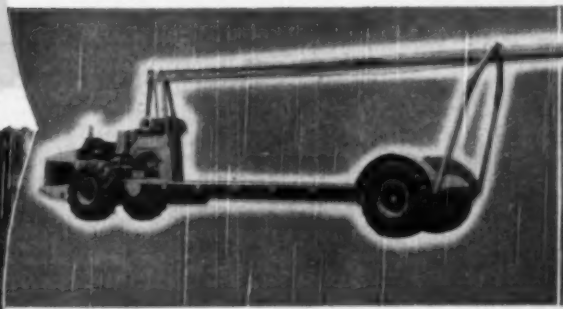
If you have work to subcontract for any of tools shown, please describe fully in letter and we will have your local LeTourneau Distributor put you in touch with nearest owner equipped to handle your work.

# .interchangeability

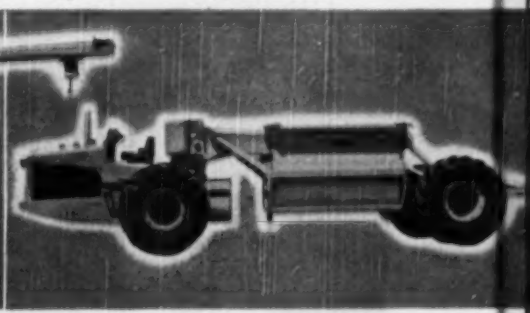


**TOURNAPULL** . . . C Roadster loads 13.5 cubic yards (capacity 16 tons). In any kind of scraper dirt on either long or short hauls, will beat all previous LeTourneau Scrapers in this size range for both output-per-day and cost-per-yard. Optional hauled units, bought as needed, cost $4500 to $7400, prime mover change takes only a few hours.

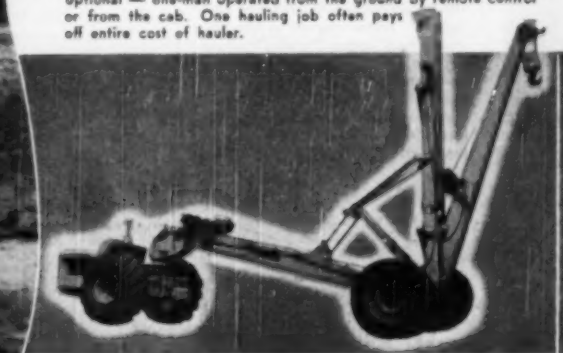
**TOURNAROCKER** . . . a revolutionary new rear-dump haul unit for use under shovel, dragline, conveyor or other loading equipment. Capacity 16 tons or 16.5 yards heaped. Big shovel target, 7' 10½" x 11' 2" . . . 15' 11" wheelbase. Simple electric body hoist. Dumps clear over bank, tips vertical to clean fast. Turning radius 90° or 12½'.



**TOURNAHAULER** . . . 20-ton flat-bed can take heavy mining equipment and supplies on or off highways or cross country. Traveling overhead monorail car with 5, 10 or 15-ton electric hoist optional — one-man operated from the ground by remote control or from the cab. One hauling job often pays off entire cost of hauler.



**TOURNAHOPPER** . . . bottom-dump hauler . . . 15-yards heaped, 16-ton capacity. Tournamatic differential, giant tires, and high clearance take it through muck and gumbo. Easy loading . . . top opening 8' x 8'. Easy to drive over windrows, clamshell-type dump-doors lift clear, give 22" clearance open. Turn radius 14'. 51% of loaded weight on drive tires.



**TOURNACRANE** . . . capacity, 15 tons with full maneuverability and travel with maximum loading. Maximum lift 35', reach 35'. Sliding boom on tilting track gives unique load maneuverability for structural repair and erection. Individual electric motors control each function independently. Reaches into "impossible" places . . . goes anywhere through sand, mud or gumbo.

**TOURNAMIXER** . . . transit-mix unit of 6 or 7 yards capacity ready to go anywhere on or off highway. Mixing speed 7 to 10 r.p.m. Two discharge speeds — 7 to 20 r.p.m. No need for chutes or elevators, Tournamixer dumps directly into forms at horizontal distance of 10' 7" back of wheels or at elevations from 4' 10" to 20' 8". All electric control from driver's seat.

**LETOURNEAU** PEORIA, ILLINOIS — JOB-PROVED Over 1000 Built and Shipped — **TOURNAPULLS**

MORE YARDS PER HOUR WITH RUBBER-TIRED POWER

# Wherever you are you're not far from

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OWNERS of General Motors Diesel engines and GM Diesel-powered equipment know they can depend upon receiving courteous service *after* as well as *before* the sale. They know that, wherever they are, a GM Series 71 Diesel Distributor or Dealer is ready to answer call for a quick tune-up, a repair or a Factory-Engineered GM Diesel part. Staffs of factory-trained service men have the tools, the know-how and a thorough, capable interest in seeing that every engine delivers its best. Here, for your convenience, is a list of GM Diesel Industrial Distributors and Dealers in strategic locations throughout the United States.

***Service Backed by Training***

**IN THE FIELD**—Completely equipped Mobile Training Units, currently touring the country, bring specialized instruction in the proper operation and maintenance of GM Diesel engines to contractors' personnel. Itinerary of the units includes scheduled visits to major construction and mining projects as well as stops at GM Distributor points where groups of smaller contractors' personnel meet for 2 or 3 day courses.

**AT THE FACTORY**—GM Distributor and Dealer service men, as well as customer personnel, take courses in the maintenance and repair of GM Series 71 Diesel engines at the Detroit Diesel Engine Division Factory Service School. Classes of 12 students are scheduled every two weeks. Enrollment is limited so that each participant may be assured of personalized instruction, with emphasis on actual shop procedures.

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**DETROIT DIESEL ENGINE DIVISION**

SINGLE ENGINES .. Up to 275 H.P. **DETROIT 28, MICHIGAN** MULTIPLE UNITS .. Up to 800 H.P.

GENERAL MOTORS

**Service also obtainable from:**
General Motors Overseas Operations
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For Allis-Chalmers Tractors—all A-C dealers

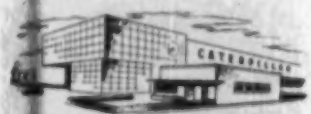
# GREAT GRADERS

They're not guessing about the value of "Cat" Diesel Motor Graders in the Big Horn Coal Co., Sheridan, Wyoming. They know from experience these husky yellow machines deliver 60-minute hours day after day even under tough going. And that's the only kind of performance that pays top dividends.

This strip mine near Sheridan is one of the largest in the northwest. Its big 20-ft. coal bed is overlain by clay. As every owner knows, profit lies under the overburden – the quicker the stripping and cleaning are done, the quicker the big shovel can go to work on the vein. Here you see a "Cat" Diesel No. 12 Motor Grader really going to town on the job. Its rugged construction, tough blade and precision controls all contribute to fast, thorough performance. There's a minimum of down time, for stamina is built–not just assembled–into every inch of its hide. Besides the No. 12, the company uses a "Caterpillar" Diesel D8 Tractor, a D318 Engine on a coal cutter and a D4400 Electric Set. Says a company official: "We're entirely sold on 'Caterpillar' Diesel power for our strip-mining job."

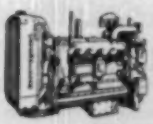
Whatever the job, there's a "Cat" Diesel Motor Grader the right size to do it most profitably for you. And there's a capable "Caterpillar" dealer near-by who's ready round-the-clock to give you "Johnny-on-the-spot" service. He sincerely believes this rugged yellow machine is the best in the field. Ask him for full proof of its performance!

**CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS**



*Only* "Caterpillar" designs and builds *every* part of the famous "Cat" Motor Graders. This undivided responsibility is your assurance of a long life of efficient, economical performance.

Each of the 3 sizes of "Cat" Motor Graders is a completely different machine. There's no performance penalty due to *excessive frame weight*, too little power or poorly matched working parts.



*Only* "Caterpillar" Motor Graders have the dependable yellow engines—the power plants that are world famous for delivering 60-minute-hour performance every hour day in and day out.

Lubricating oil is cooled in this radiator section to minimize carbon lacquer and gum formations —enemies of long engine life. Lower temperatures preserve the lubricating qualities of the oil.

Safe and sure Diesel starts are assured by this electrically started gasoline engine. It warms the coolant and allows the Diesel to circulate "lube" oil before actual starting.

Castings like this cylinder head on "Cat" Diesels are made right in "Caterpillar's" own foundry, where tolerances and quality can be closely controlled — another example of precision engineering!

# CATERPILLAR

REG. U. S. PAT. OFF.

**ENGINES • TRACTORS • MOTOR GRADERS**

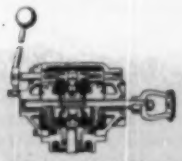
# ...and here's the proof!

Typical of "Caterpillar" quality are these aluminum alloy pistons. Tops are oil sprayed for coolness and long life. Cast iron compression-ring belt keeps this vital ring working at top efficiency.

"Caterpillar"-built fuel injection equipment is trouble-free and fool-proof. Injection capsules and pumps can be replaced on the spot in the field — no adjustments are necessary.

Exclusively "Caterpillar," these solid aluminum "con" rod bearings give low rate of wear, ability to carry heavier loads, exceptional heat transfer characteristics and high corrosion resistance.

"Caterpillar" Motor Graders are designed for exceptionally good operator visibility. Sitting down, the operator can see toe and heel of the blade with equal ease. That helps keep jobs moving.



Mechanically operated controls give the user the constant control that is so necessary for precision work. They're quality built — changes in temperature do not affect them.

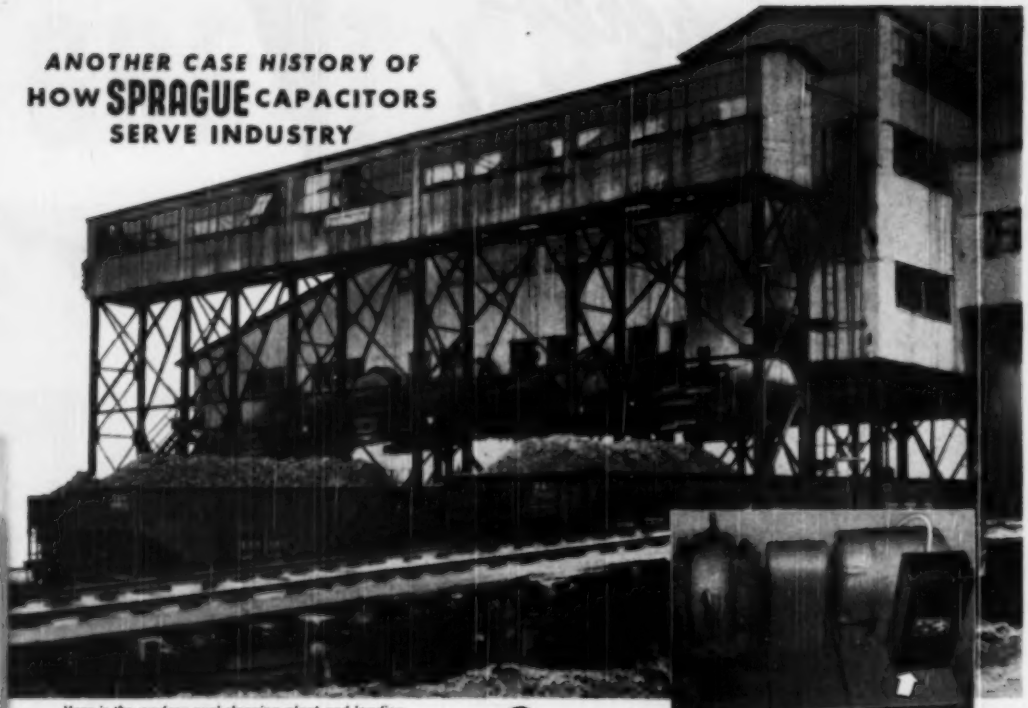
"Caterpillar's" exclusive side-shift mechanism allows extreme blade positions without the need for manual adjustment of linkage. You'll find this a real work- and time-saver on the job.

# DIESEL

**EARTHMOVING EQUIPMENT**

**Ask your dealer for a demonstration! Ask him for a showing of the new film, "Better Blading"!**

ANOTHER CASE HISTORY OF
HOW SPRAGUE CAPACITORS
SERVE INDUSTRY



Here is the modern coal cleaning plant and loading tipple of the Elk Lick Coal Co., Jerryville, W. Va.

# POWER BILLS *Slashed* BY $1750 PER YEAR!

Here's how the management of one enterprising coal company cut its electric power costs simply, easily, and quickly! They installed Sprague Power Factor Correction Capacitors at the source of low power factor—the load!

Not only did this remove excess load from motor circuits and controls, and reduce transformer loading appreciably, but it also earned rate bonuses on the electric power bills.

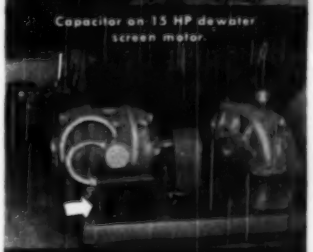
*During the month following installation of Sprague Capacitors, 7.8% more kilowatt-hours of energy were used yet the power bill was 6.4% less.* This saving was possible because of the decrease in demand charges as a direct result of the capacitor installation. The investment in capacitors will be returned in a year's time.

You too can effect savings in power bills and reduce circuit and transformer loads. Let us survey your plant and show you how . . . AT NO COST TO YOU. Write for details today.



Capacitor on 3 HP sand elevator motor.

Capacitor on 15 HP dewater screen motor.



Capacitor on 40 HP raw coal flight conveyor motor.

SPRAGUE

SPRAGUE ELECTRIC COMPANY
North Adams, Massachusetts

PIONEERS IN
ELECTRIC AND ELECTRONIC DEVELOPMENT

# World's record "underground railroad"

## Goodyear COMPASS Belt Is Longest Single-Flight Conveyor Ever Installed In Mine Entry

LONGEST single-flight belt installed in an underground entry is the Goodyear COMPASS 40 conveyor recommended by the G.T.M.—Goodyear Technical Man—for a West Virginia company. Spliced endless, and operating around pulleys 4000 ft. on centers (soon to be extended to 6000 ft.), it carries a maximum of 300 tons per hour at 350 f.p.m. The blueprint below shows you how Goodyear's exclusive COMPASS construction makes this huge belt possible.

Ask the G.T.M. to demonstrate the lower haulage costs you can get with COMPASS belts—over any distance from a mile or more underground to over a hundred miles cross country. You can reach him through your nearest Goodyear Industrial Rubber Products Distributor, or by writing Goodyear, Akron 16, Ohio.

**FOR HOSE, FLAT BELTS, V-BELTS, MOLDED GOODS, PACKING, TANK LINING** built to the world's highest standard of quality, phone your nearest Goodyear Industrial Rubber Products Distributor.

GOODYEAR INDUSTRIAL RUBBER PRODUCTS
-Specified COMPASS 40 CORD CONVEYOR BELT
for LONG-DISTANCE HIGH-TENSION OPERATION
A
B
C
A—Tough, long-wearing cover protects carcass
B—Single plane of rope cords give high-tensile strength, practically zero stretch. Extra flexibility permits more compact installation with smaller pulleys
C—Fabric envelope protects cords
Mildew-inhibited throughout

Compass—T.M. The Goodyear Tire & Rubber Company

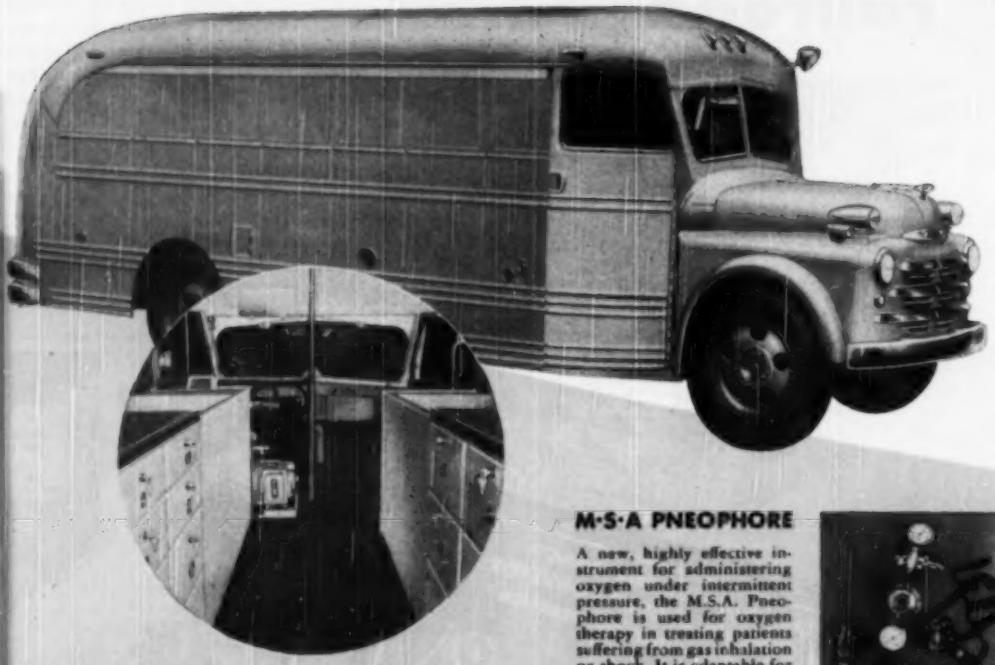
*We think you'll like "THE GREATEST STORY EVER TOLD"—Every Sunday—ABC Network*

# GOODYEAR

THE GREATEST NAME IN RUBBER

PROVEN DEPENDABILITY *in time of urgent need...*

# MINE RESCUE



## M·S·A MOBILE SAFETY STATION

Effectively meeting mining requirements as rescue station, maintenance shop, traveling classroom, first aid ambulance, and field testing laboratory, this important M.S.A. development affords mobility, speed, and efficiency in service. Engineered throughout for maximum utility, M.S.A. Mobile Safety Stations are equipped with every essential for field operations, furnished to particular specifications.

Specially designed built-in cabinets, racks and compartments accommodate the equipment carried with easy accessibility. Work areas are ample and unobstructed. Typical equipment includes a wide range of mine rescue aids, dust control kits and sampling outfits, gas analysis equipment, complete first aid equipment (with adequate space provided to accommodate six stretcher patients), instruction facilities for first aid and mine safety procedure, and many other desirable additional features. Write for Bulletin BH-3,

## M·S·A PNEOPHORE

A new, highly effective instrument for administering oxygen under intermittent pressure, the M.S.A. Pneophore is used for oxygen therapy in treating patients suffering from gas inhalation or shock. It is adaptable for use with any oxygen supply, and operates without suction or excessive pressure, automatically following the breathing requirements of the patient. Bulletin CV-3.

## H-H INHALATOR

Used in conjunction with artificial respiration, the well-known H-H Inhalator supplies a correct mixture of oxygen-carbon dioxide to the lungs of the unconscious patient—aiding more rapid recovery from exposure to gases or electric shock. Bulletin CA-9.

# EQUIPMENT by MSA

SAFETY EQUIPMENT HEADQUARTERS

## McCaa TWO-HOUR OXYGEN BREATHING APPARATUS

Standard of the mining industry for long-period respiratory protection in fighting and sealing mine fires, re-establishing ventilation, and rescue work, the McCaa Two-Hour Oxygen Breathing Apparatus is compact and self-contained. Supplying complete respiratory protection for the wearer in unbreathable atmospheres for a minimum of two hours, even under hard physical exertion, the Apparatus is approved by the U. S. Bureau of Mines. The unit employs a high-pressure oxygen cylinder, and a regenerator which removes carbon dioxide from the expired breath and returns the oxygen content to the circulatory system. All parts of the circulatory system are under positive pressure, eliminating entrance of outside atmospheres. For detailed information, write for Bulletin BB-3.

## M·S·A Chemox OXYGEN BREATHING APPARATUS

For respiratory protection in unbreathable air, Chemox—a self-generating oxygen breathing apparatus,—offers the advantages of lightest weight (only 13½ lbs. complete), extreme simplicity of operation, and replaceable canisters which can be stored indefinitely and are always ready for instant use. No high-pressure cylinder, valves or fittings. U. S. Bureau of Mines approved. Bulletin B-14.

## M·S·A ALL-SERVICE GAS MASK

Wherever 16 per cent or more of oxygen is present in the mine atmosphere, the famous All-Service Mask provides safe respiratory protection against gases (including carbon monoxide) and smokes. Light and comfortable to wear, with quickly-adjusted All-Vision Facepiece, the Mask uses the long-lived All-Service canister, which is quickly replaceable when required. Write for Bulletin EA-8.

**MINE SAFETY APPLIANCES COMPANY**

BRADDOCK, THOMAS AND MEADE STREETS . . . . . PITTSBURGH 8, PA.

*At Your Service:* 48 BRANCH OFFICES in the UNITED STATES

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# CUMMINS DIESEL

SINCE 1918...PIONEER OF PROFITABLE POWER THROUGH HIGH SPEED DIESELS

## Here's what you get with

# Cummins Diesels

Here are four more reasons for high goodness
examples of how owners have served
industry—and made money—with Cummins
Diesel Engines

**Service** One of the more than 200 Cummins Dealers is as close as your phone.

***Highspeed Diesel Engines (50-550 hp) for:***

On-highway trucks • off-highway trucks • buses • tractors • earth-movers • shovels • cranes • industrial locomotives • air compressors • logging yarders and loaders • drilling rigs • centrifugal pumps • generator sets and power units • work boats and pleasure craft.

CUMMINS ENGINE COMPANY

## LESS FUEL

*On one shift,* this Cummins-Powered Autocar *hauled 42 tons more* and used $7.48 *less fuel* than a comparable gas-powered Autocar. Both trucks are operated by W. D. Hopkins, Shady Springs, W. Va., contract coal hauler. They are used on a 25-mile round-trip run over mountain highways. The Cummins-Powered unit works 10 to 12 hours per day, hauls an average of 225 tons a day.

## LESS MAINTENANCE

Six 275 hp Cummins Diesels powering Kenworth coal haulers used at the Homestead Mine near Earlington, Ky., *required no repairs in the first 16 months of operation.* Carrying 35-ton loads, these Cummins-Powered units each average 40 trips a shift on the three to four-mile round-trip haul from pit to tipple.

## LONGER LIFE

*The first Cummins Diesel* to enter the coal stripping area around Mount Carmel, Pa., *is still on the job, working 14 hours a day.* The *15-year-old* Model HA-600 Cummins Diesel powers a Walter dump truck in the Kingston Contracting Company fleet at Shenandoah . . . is used on the tough haul from stripping to breakers. On this job Kingston standardizes on Cummins Diesels for all hauling operations.

## MORE WORK

A generator powered with a Model NHP-601 Cummins Diesel works 16 hours a day at the Ball and Collins slope mine near Hewett, W. Va. The Cummins Diesel has piled up 6,000 operating hours and uses only 32 gallons of fuel on two shifts. It powers the following equipment: a coal cutting machine, two mine locomotives, a 400-foot chain conveyor, and a coal drill. Partner Harold Collins says: "We haven't had a minute's trouble since we installed the "NH" Cummins Diesel—no downtime at all."

**These typical examples of the profit-making power furnished by Cummins *Dependable* Diesels explain why men who pay the most attention to cost sheets and profit and loss statements choose Cummins Power. Write for further proof that Cummins Diesels can save and make *more* money for you.**

*Cost Conscious?* **CHOOSE CUMMINS DIESELS**

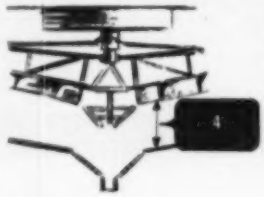
**INC. • COLUMBUS, INDIANA**

**•EXPORT: CUMMINS DIESEL EXPORT CORPORATION • COLUMBUS, INDIANA, U.S.A. • CABLE: CUMDIEX**

# *Water Recovery a Headache?*

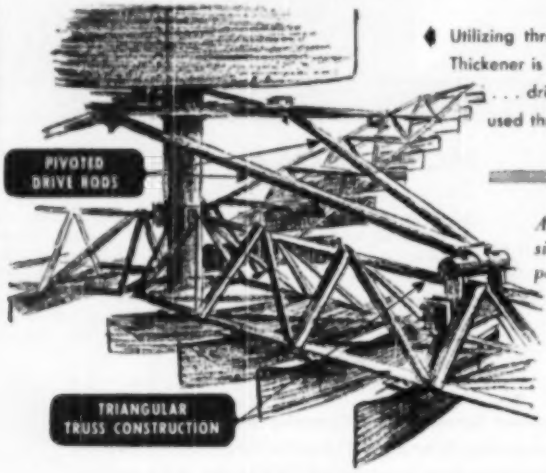
## HERE'S AN ECONOMICAL WAY TO HANDLE COAL WASHING WASTE WATER...

Designed to remove big tonnages of granular solids, the Dorr Type H Thickener is an ideal answer to the problem of handling breaker wash water. In one continuous operation the Type H clarifies water for reuse in the breaker . . . prevents stream pollution . . . recovers fine coal.



An automatic hydraulic lift actuated by the torsional load quickly raises rakes when a shock overload occurs . . . lowers them slowly to work it off without stalling. If the washery is shut down overnight, no difficulty is encountered in starting up. Wash water from the breaker can immediately be fed in for subsequent clarification.

The free center cone discharge is of the greatest importance. The entire mechanism is supported by a truss spanning the tank—no central support column—no underwater bearings. Impacting of heavy, granular solids is impossible . . . discharge is free and continuous with no clogging.




Utilizing three powerfully built rake arms, the Dorr Type H Thickener is driven by a heavy-duty, balanced spur-gear drive . . . drive rods are pivoted . . . triangular construction is used throughout to insure maximum strength and rigidity.

*Available in sizes ranging from 50 to 100 feet in diameter, single units will handle from 100 to 1000 tons of solids per hour. A Dorr engineer will gladly supply more detailed information covering your particular problem.*

DORRCO

**THE DORR COMPANY, ENGINEERS**
BARRY PLACE, STAMFORD, CONN.

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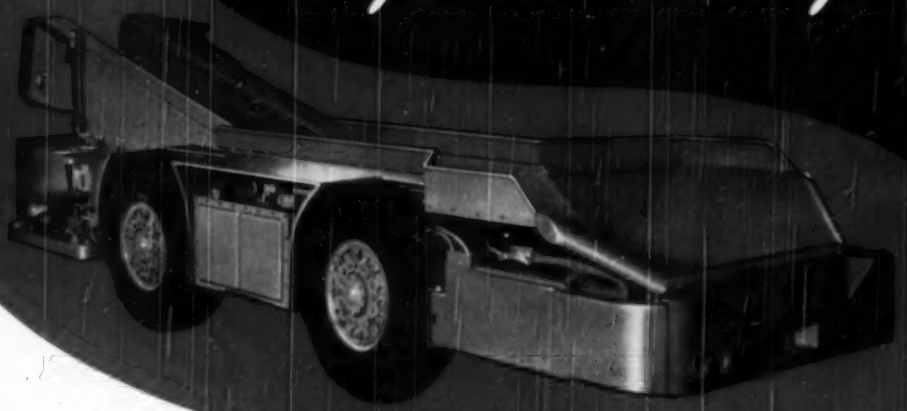
DORR

RESEARCH ENGINEERING EQUIPMENT

# A SHORT CUT
## *to greater savings*



Jeffrey Cable Reel Shuttle Car (43" high) with elevating discharge.

# JEFFREY
## *Cable Reel*
# SHUTTLE CARS

Jeffrey Shuttle Cars have proved most economical in transporting coal from face to main line haulage and have been a big factor in cutting production costs.

***Three sizes with capacities as follows:***

| Height | Side Boards | Capacity in Tons |
|---|---|---|
| 29" | 0 | 3.20 |
| | 6" | 4.22 |
| 35" | 0 | 3.75 |
| | 6" | 4.80 |
| 43" | 0 | 4.75 |
| | 6" | 6.25 |
| | 12" | 7.75 |

Furnished in either 2-wheel drive with 2-wheel steering or 4-wheel drive with 4-wheel steering. Elevating discharge is standard on all cars. Operator's compartment can be located on either side of car—depending upon your needs.

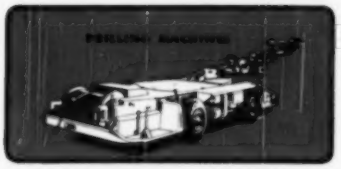
*For complete data on all models, capacities, standard equipment, etc., write for Catalog No. 816.*

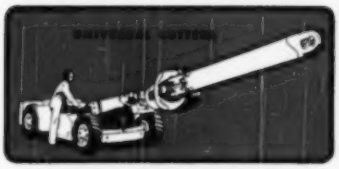
Jeffrey Cable Reel Shuttle Car (29" high) with elevating discharge.

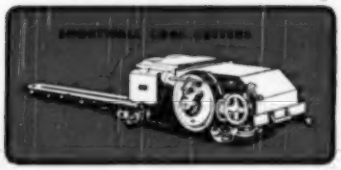
WHEREVER COAL IS MINED YO

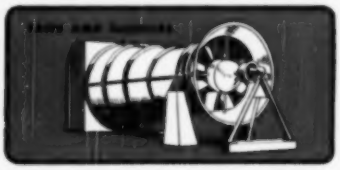
View of Jeffrey 43" high Shuttle Car being loaded at the face in a large West Virginia mine

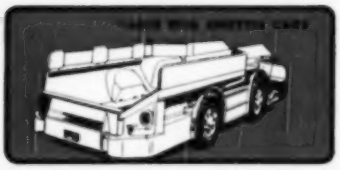
OU'LL FIND JEFFREY EQUIPMENT

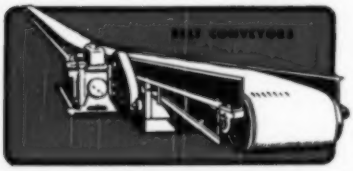


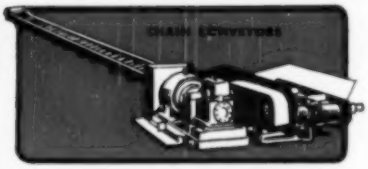


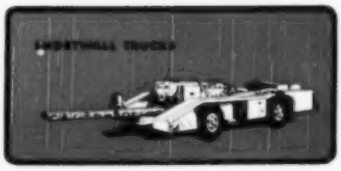












# JEFFREY

## EQUIPMENT FOR COAL MINES

**THE JEFFREY MANUFACTURING COMPANY**

*Established 1877*

*General and Export Sales Offices*

**COLUMBUS 16, OHIO, U. S. A.**

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BOSTON 16, 38 Newbury Street
BUFFALO 2, Jackson Building
CHICAGO 1, Bell Building
CINCINNATI 2, Carew Tower
CLEVELAND 13, Rockefeller Building
DENVER 2, Ernest & Cranmer Bldg.
DETROIT 13, 5808 St. Jean Avenue
HARLAN, Kentucky
HOUSTON 2, TEXAS, City National Bank Bldg.
HUNTINGTON 19, W. VA., Guaranty Bank Bldg.
JACKSONVILLE 2, Barnett Bank Building
MILWAUKEE 2, 735 N. Water Street
NEW YORK 7, 30 Church Street
PHILADELPHIA 3, Broad St. Station Bldg.
PITTSBURGH 22, Oliver Building
SALT LAKE CITY 1, 101 W. 2nd South St.
ST. LOUIS 1, Railway Exchange Bldg.
SCRANTON 3, 122 Adams Avenue

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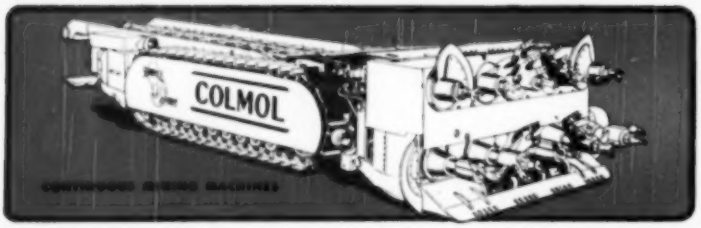
In West Virginia: BECKLEY — CABIN CREEK — LOGAN — MORGANTOWN — WELCH

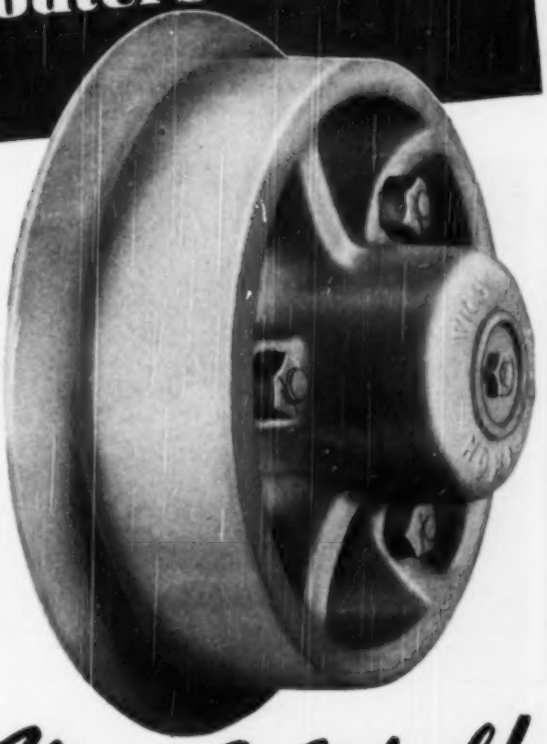
***FOREIGN PLANTS***

JEFFREY MANUFACTURING CO., LTD., Montreal, Quebec
BRITISH JEFFREY DIAMOND LTD., Wakefield, England
JEFFREY-GALION (PTY.) LTD., Johannesburg



## Performance records prove...

# ...with practically no maintenance..you'll haul up to 50% greater loads on S-D "Floaters"...



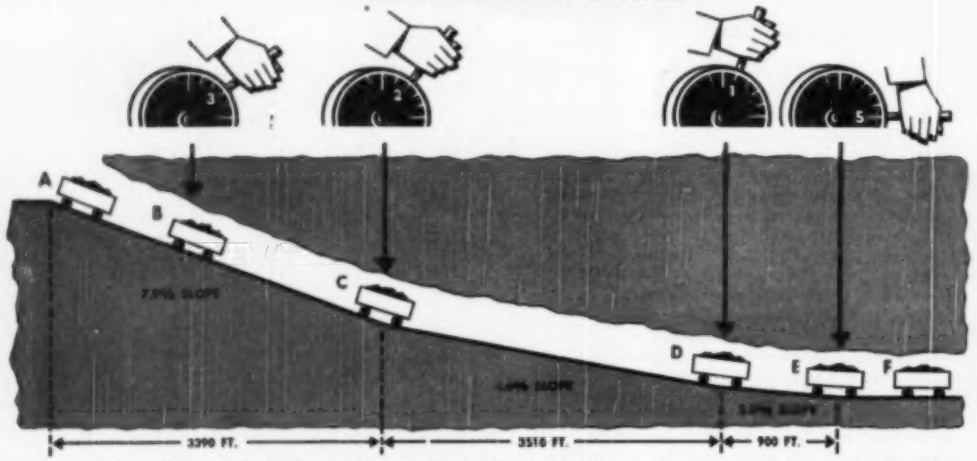
Tests conducted by independent engineering firms and performance records at the mine have proved that locomotives will pull up to 50% greater loads, when cars are equipped with S-D "Floater" Wheels, instead of wheels with other types of precision bearings. But this saving in power and time is only a portion of the profit you gain by using S-D "Floaters." When it comes to maintenance you really pick up profit because S-D "Floaters" literally "hate to be greased." One greasing in 5 years is often sufficient. Common labor can demount and remount a "floater" wheel easily . . . in less time than it takes to smoke a cigarette, because no adjustment whatsoever is necessary on the bearings. Add to this the fact that the big cause of bearing failure (bearings running too tight or loose) has been eliminated and you can understand why more and more operators are specifying S-D "Floaters" for all wheel replacements. For complete information, write Sanford-Day Iron Works, Knoxville, Tenn.

*America's No. 1 Mine Car Wheel!*

**SANFORD - DAY IRON WORKS**

# Cut brake wear!
# Save spotting time!
# Promote safe lowering!

**HOW DYNAMIC BRAKING HOLDS THIS UNBALANCED SLOPE HOIST TO APPROXIMATELY 40% FULL SPEED**




**A** At start, car is lowered by gravity and allowed to accelerate to 40% full speed.

**B** Dynamic braking is then applied in order to prevent speed increase.

**C** Because of slope change, only approximately 25% braking torque is required to hold speed.

**D** Electric braking is further decreased to about 13% to correspond with reduced pitch of track.

**E** At bottom, 100% braking torque is applied to decelerate to low speed for spotting.

**F** Mechanical brakes are applied only at end of trip to spot and hold cars.

To provide allowable man-trip speed while lowering, 40% of the full rated speed of 1200 fpm is desired over the 7800-foot length of travel. Using dynamic braking to obtain this desired speed, the operator watches his electric rope-speed indicator and simply moves his master switch to the points of braking required. Thus the speed is held in good control.

GENERAL ELECTRIC

663-4

## General Electric a-c mine-hoist drive in this unbalanced-slope installation uses d-c dynamic braking control to give these advantages in reduced-speed lowering

To increase hauling capacity, the operators of a West-Central Pennsylvania mine recently installed a co-ordinated General Electric a-c mine-hoist drive. Replacing a smaller one, the new drive has boosted payload capacity to 95 tons per trip—330 tons per hour!

But that's not all! Use of d-c dynamic braking to control the hoist motor during reduced-speed lowering also provides these advantages:

**Safety promoted!** Lowering man-and-material trips are made at safe, uniform speeds, without jerking.

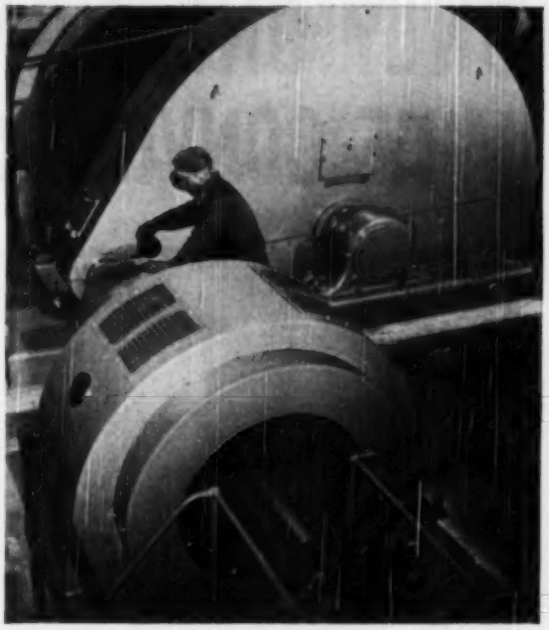
**Maintenance costs cut!** Mechanical brakes are used only to hold trip at its destination and for final stopping after retarding to low speed with dynamic braking—thus lessening strain and wear on brake wheels and linings.

**Spotting time reduced!** Control of low-speed lowering permits spotting, landing, and dropping trips into partings with minimum delay.

### *Economy! Simplicity! Reliability!*

G-E induction-motor mine-hoist drives combine the advantages of low first cost and upkeep, simple installation and operation, high efficiency, and rugged reliability. That's why over 800 are now in service, helping to step up mine production and cut hoisting costs.

For experienced help on mine-hoist drives and other electric equipment to cut mining costs, it will pay you to call in a G-E mining specialist. Phone him at your nearest G-E office. *Apparatus Dept., General Electric Co., Schenectady 5, N. Y.*



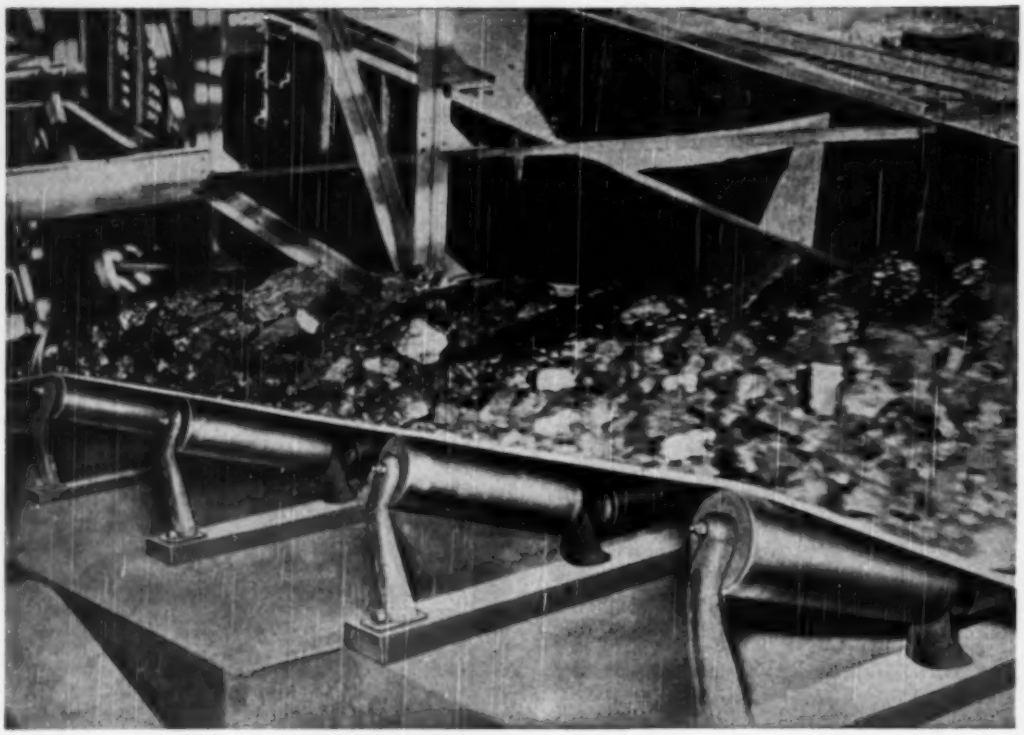
Typical of hundreds of others is the G-E 800-hp wound-rotor induction motor geared to the hoist at this mine. In ratings from 50 to 3500 hp, these motors offer the simplest way to obtain the advantages of electric drive for mine hoists.

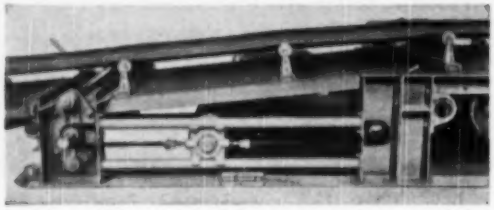
G-E control and protective equipment, located in the hoist house conveniently near motor and drum, provides full magnetic reversing d-c dynamic braking control of the hoist motor and protection of machines and power system.

**Mine-Hoist Drives**

**...to cut mining costs!**

# ONLY ONE FIRM TAKES FULL MINE CONVEYOR PERFORMANCE



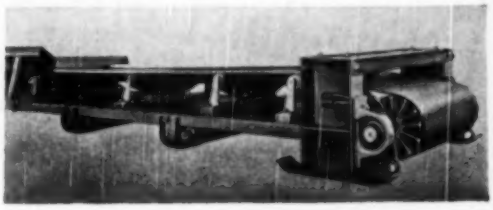


**TAIL SECTION**

Telescopic type to provide tail takeup action. Easy to clean out—no steel work under tail pulley. Has transverse cover to protect pulley, bearings *and belt*. Strong enough so you can rest a feeder on it.

**INTERNAL TAKEUP**

Located directly back of the drive. Handles 10′ of belt slack. Operated by reversible ratchet-wrench working on gear reduction to minimize manual effort. Double-acting pawl prevents backing-up. Worked from either side of conveyor.



# RESPONSIBILITY FOR COMPLETE

## . . . only HEWITT-ROBINS makes and guarantees both machinery and belt

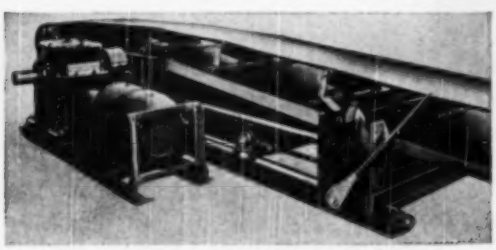
No longer need you worry about your Mine Conveyor operation—wondering who will be responsible for the successful, *lasting* performance of its machinery *and belt.*

Get your Mine Conveyor from Hewitt-Robins. Here is a company—the only company in all the world—able *and willing* to take complete *unified* responsibility for the installation. For only Hewitt-Robins makes both machinery *and belt.*

The machinery is the sturdy, strong, substantial construction made by the Robins Conveyors Division and installed in all the better mines. The belt is the famous Division Ajax® Underground Belt—with mildew inhibitors and acid neutralizers compounded in its wear-resisting rubber covers and high tensile fabrics in its enduring carcass—made by the Hewitt Rubber Division.

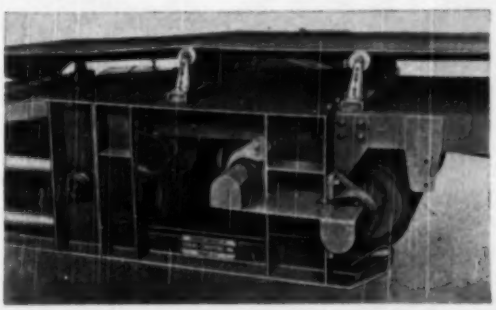
Yes, when you buy a Hewitt-Robins Mine Conveyor you get not only the best elements —machinery and belt—that your money can buy; you also get the satisfaction and peace of mind that come from having one unified source guaranteeing successful performance.

Hewitt-Robins Mine Conveyors can be shipped complete—machinery, belt, motors, reducers and drives—out of stock from Passaic, N. J., and Charleston, W. Va., in belt widths 26", 30" and 36", any desired length. For immediate delivery, get in touch with Hewitt-Robins, Inc., 1010 Pennsylvania Ave., Charleston, W. Va., or 270 Passaic Ave., Passaic, N. J.



**UNIFIED DRIVE SECTION**

Motor, reducer and controls mounted on a single base—skid-designed for easy moving about. Can be located on either side of the conveyor. Drive reversible—incoming for men and material, outgoing for high output of product.



**SINGLE OR TANDEM DRIVE**

Hewitt-Robins Mine Conveyors come equipped with *both* single and tandem pulley drive elements. Provide ample horsepower for lift and length up to the very limits of belt capacity. Reeving of belt handles level, uphill or downhill service requirements.

**HEWITT-ROBINS**
**MINE CONVEYORS**

**HEWITT-ROBINS** (HR) **INCORPORATED**

BELT CONVEYORS (belting and machinery) • BELT AND BUCKET ELEVATORS • CAR SHAKEOUTS • DEWATERIZERS‡ • FEEDERS • FOAM RUBBER PRODUCTS • FOUNDRY SHAKEOUTS • INDUSTRIAL HOSE • MINE CONVEYORS • MOLDED RUBBER GOODS • RUBBERLO-T ROTARY WIRE BRUSHES • SCREEN CLOTH • SKIP HOISTS • STACKERS • TRANSMISSION BELTING • VIBRATING CONVEYORS, FEEDERS AND SCREENS

# ONE Grease for ALL

**"Yes—One Grease, One Gun and A Better Job too!"**

**Here is a versatile grease that can be used with absolute confidence wherever lubrication is needed—chassis, wheel bearings, water pumps, universal joints, etc., in winter or summer—under *all* kinds of operating conditions.**

## *These 4 Severe tests prove SINCLAIR LITHOLINE is better than any single grease!*

**WATER RESISTANCE TEST!**

**Samples of each grease are heated in beakers of water. Near boiling, the sodium grease disintegrates into soapy water and oil. Shortly after boiling the calcium grease shows foamy emulsion as grease absorbs excess water. Litholine remains unaffected, proves its superiority in combating wet conditions.**

**SCENE:** Sinclair's Research Laboratories, Harvey, Ill.

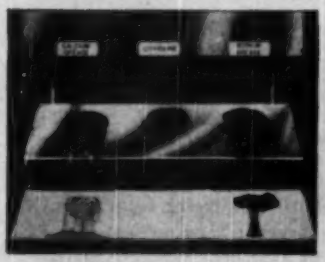
**CAST:** Two commonly-used greases of highest quality; a calcium soap chassis lubricant and a sodium soap wheel bearing grease; and Sinclair's Litholine.

## SINCLAIR REFINING

# Lubrication Jobs!

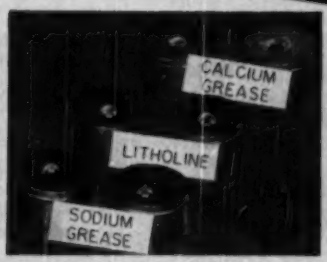
## LOOK WHAT ONE-GREASE—ONE-GUN LUBRICATION MEANS TO YOU...

1. Superior protective lubrication
2. No danger of misapplication
3. Less chance for contamination
4. Reduced time-out for lubrication and maintenance
5. Fewer servicing man-hours
6. Less wastage
7. Fewer dispensing units
8. Smaller grease inventories
9. Simplified purchasing and distribution
10. A finer grease at every lubrication point



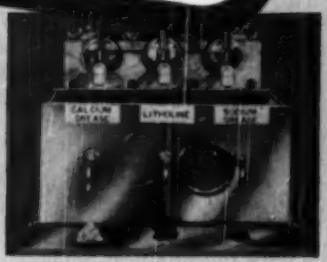
**HEAT-RESISTANCE TEST!**

The samples are heated on a plate. At 190°F., the calcium grease disintegrates. At 340-350°F., the sodium soap structure collapses and releases the oil. Bearing failures would follow. At 380°F., Litholine shows no effects, proves superior for high temperature lubrication jobs.




**MECHANICAL STABILITY TEST!**

Worked (kneaded) samples are placed beside samples of unworked grease. Steel balls are dropped. Distance ball sinks in worked samples shows increase in softness—loss of stability. The calcium grease showed greatest increase in penetration, the sodium grease next. Litholine showed no difference whatever . . . proving its superior mechanical stability in service.



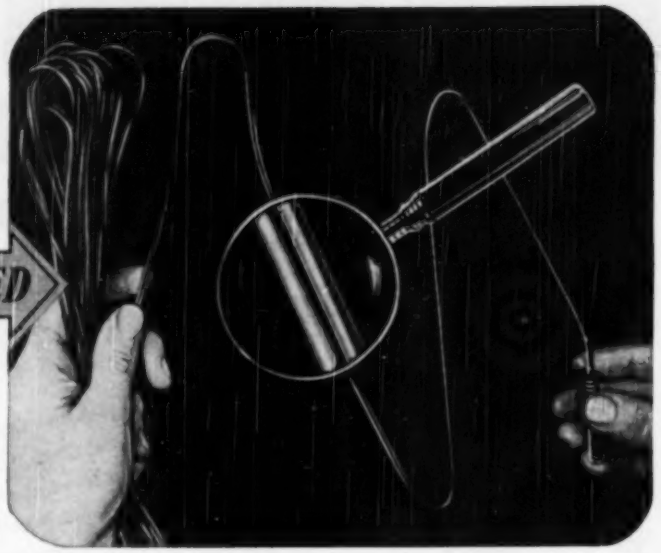
**LOW TEMPERATURE PUMPABILITY TEST!** Lever-type grease guns are filled with chassis greases and cooled. At 20°F., it is impossible to pump the sodium grease. At 0°F., it is impossible to pump the calcium grease. But Litholine still pumps in good volume! Yet Litholine is a heavier (harder) grease. Thus, Litholine has the body for summer service yet is pumpable in severely low temperatures.

**COMPANY**

For lubrication counsel, or more information on Litholine, see your nearest Supplier of Sinclair Products, or write to Sinclair Refining Company, 630 Fifth Avenue, New York 20, New York.

# Blasters Agree...

## The New ATLAS PLASTIC-INSULATED Blasting Cap Wiring



## Meets The Most Exacting Demands

### *Here's why:*

1. ***It's really tough—and truly waterproof!*** Thick plastic covering, made to withstand rough handling in jagged bore holes. Fully waterproof. Extremely high insulating value.
2. ***Less kinking and snarling!*** With minimum care, it folds or reels out without tangles or kinks—saves time and tempers in hooking up.
3. ***Flexible at 20° below zero!*** Made to withstand Arctic or Tropic weather.
4. ***Easy on eyes and hands!*** No eye-strain to see the brilliant orange or yellow wire, even in dull light. No rough edges when duplex wire is separated into single strands.
5. ***Stands up to rigid tests!*** Compare it with other wire for these outstanding properties; and also for high tensile and compression strength; resistance to deterioration from weather, rodents, vermin.

*You* can save time and trouble—that means *money*—on blasting jobs with the new Atlas plastic-covered leg wires and connecting wiring. This latest Atlas contribution to explosives progress comes up to the highest expectations—and more—of men who use electric blasting caps under the roughest field conditions. Now available in duplex on all Atlas Manasite electric blasting caps with wires 30 feet long or more. Two single plastic-covered wires on shorter lengths. Made by the developers of ROCKMASTER, the original split-second delay blasting system.

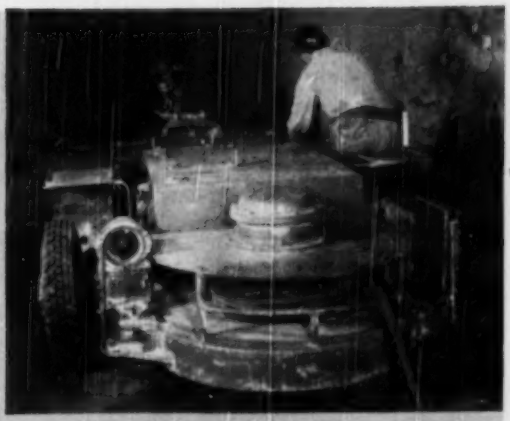
ROCKMASTER, MANASITE: Reg. U. S. Pat. Off.

**ATLAS EXPLOSIVES**
*"Everything for Blasting"*

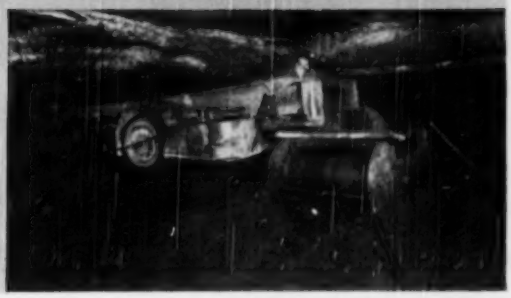
CHEMICALS ATLAS EXPLOSIVES

**ATLAS POWDER COMPANY, Wilmington 99, Del.** • ***Offices in principal cities*** • ***Cable Address—Atpowco***

# How much does cable failure cost you in "DOWN TIME"?







Photos—Courtesy Joy Manufacturing Co., Pittsburgh, Pa.

Simple arithmetic will give you the answer. For instance, a single typical mobile unit represents an investment of some $60,000. With a capacity of approximately 400 tons per shift, even a 10 minute "down time" of such a unit at the *wrong* time can be very costly. Insure yourself against this lost production with Rome 60 Mining Cables.

With Rome 60 on the job you are sure of top performance . . . plus, strict compliance with Federal and State of Pennsylvania safety requirements. Rome 60 Mining Cables are designed for hard usage and made to give long service life. In the shuttle car cable illustrated above note how the grounding conductor is webbed with Neoprene . . . as a matter of fact, solidly embedded in molded Neoprene . . . providing added separation between it and the power conductors. This feature minimizes "shorts," provides maximum flexibility, greater impact resistance and additional safety factor.

**ROME 60 MINING CABLES ARE:**

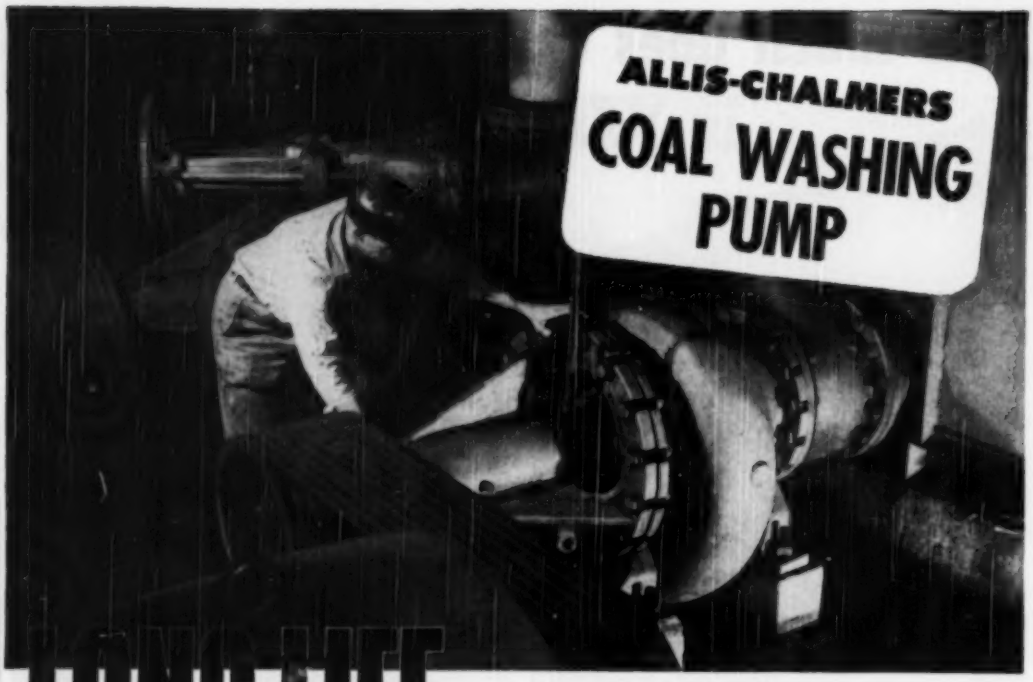
- Insulated with heat-resistant rubber for continuous 75° C. operation with greater overload protection.
- Sheathed with Neoprene, *molded in lead*, for high resistance to moisture, flame and abrasion.

Make sure that your next mine cable is Rome 60.

***It Costs Less to Buy the Best . . . Buy Rome 60***

**ROME CABLE**
*Corporation*
ROME · NEW YORK
From Bar to Finished Wire

ROME CABLE ROME, N.Y.




# LONG LIFE plus easy servicing

## GIVE YOU LOWER PUMPING COSTS

USERS HAVE REPORTED as much as four times longer life with Allis-Chalmers coal washing pumps because they are made of special hard *Allisite* alloy . . . because they have thicker sections and heavier parts throughout . . . and because they are application engineered by specialists who know coal washing problems and how to solve them.

### Replace Worn Parts In Half Hour

When parts must be replaced, as they must in all coal washing pumps, you will save many hours of time and many dollars of expense with the Allis-Chalmers coal washing pump. This pump is designed with only five wearing parts, all made for easy handling and replacement. The pump can be torn down, an element replaced and the pump reassembled in less than a half hour. Piping need not be disturbed unless casing must be replaced.

Three sets of bearings, brackets and shafts cover all pump sizes making spare parts inventory low regardless of the number of pumps you operate. Head and capacity can be changed instantly when the drive is equipped with the new *Vari-Pitch* Automatic sheave and *Texrope* V-belt drive.

### Get The Facts Now

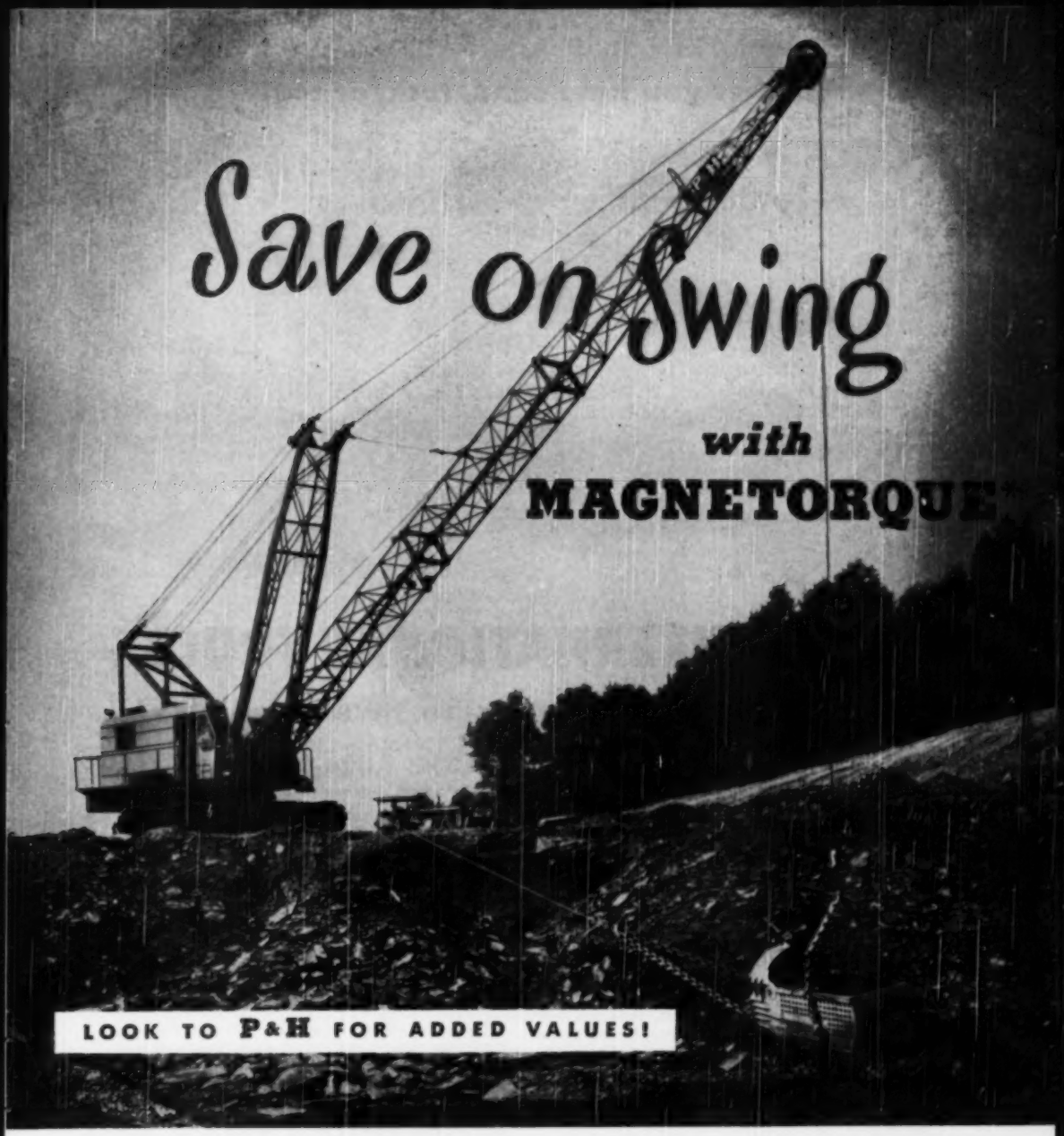
Discuss your coal washing equipment problems with an Allis-Chalmers pump engineer. He can show you dollars and cents savings you can make. Contact your A-C Sales Office today. Or write for Bulletin 08B6381. A-2991

*Vari-Pitch, Texrope* and *Allisite* are Allis-Chalmers trademarks.

**ONLY FIVE WEARING PARTS**
**Shaft sleeve, impeller, casing, two wear plates. All easy to handle and easy to replace.**

ALLIS-CHALMERS, 968A SO. 70 ST.
MILWAUKEE, WIS.

# ALLIS-CHALMERS




Faster digging cycle... up to 20 percent faster... is yours with the P&H Magnetorque* electric swing. Only Magnetorque can give you faster, smoother starts and stops that make this possible. It means greater production, lower cost, and more profits. You'll say it's the greatest advancement ever made on large draglines and shovels. You can say good-bye to swing friction troubles ... once and for all. Power is transmitted electro-magnetically... there's no friction... there's no wear... and far less time-outs to rob production. The smooth operating Magnetorque lasts the life of the machine.

On all kinds of digging the Magnetorque can help you cut yardage costs. Magnetorque electric swing is standard on the P&H 1055 (3½ cu. yds.) and the new 955-A (2½ cu. yds.). Write today, for more information.

*T.M. of Harnischfeger Corporation for electro-magnetic type clutch.

P&H EXCAVATORS
4540 W. National Avenue
Milwaukee 14, Wis.
HARNISCHFEGER CORPORATION

EXCAVATORS • OVERHEAD CRANES • ARC WELDERS AND ELECTRODES • SOIL STABILIZERS • CRAWLERS AND TRUCK CRANES

## Whether you haul sand, rock, or coal . . .

# *NEW* INTERNATIONAL TRUCKS

### ARE *Heavy-Duty Engineered* TO SAVE YOU MONEY

Heavy-duty engineering for long truck life on tough truck jobs is yours now in every single new International Truck from 4,200 to 90,000 pounds GVW.

That's the same extra value engineering that has kept Internationals first in the sale of heavy-duty trucks for 18 straight years.

Cost-conscious, profit-minded heavy-duty truck users have preferred Internationals year after year for only one reason: heavy-duty engineering means that International Truck performance is longer life performance, lower operating and maintenance cost performance.

And now the same management, engineers, test experts, and production men who kept Internationals a tradition in the heavy-duty truck field have developed *every new International Truck*. No matter what size truck you use, there's a heavy-duty engineered International Truck that's right and ready for you!

**You'll find new comfort in the new Comfo-Vision Cab**

Model for model, here is "the roomiest cab on the road." It gives you new comfort in easy-riding cushions, adjustable seats, controlled ventilation. It gives you full front visibility through a one-piece, scientifically curved Sweepsight windshield.

And comfort is right at your fingertips when you take the sturdy wheel. The entire steering system is engineered for more positive control from a more comfortable position.

**You'll get an all-new truck proved under actual operating conditions**

"Proved under actual operating conditions" takes in years of time, millions of dollars, countless miles. But these new Internationals took in all those and then some—to give you proved-in-advance performance.

No matter what kinds of roads or loads, climate or conditions your trucks must meet, there's a new International that has been *proved* right for your requirements.

Find out all about that truck from your nearest International Truck Dealer or Branch, *soon*.

International Harvester Builds
McCormick Farm Equipment and Farmall Tractors
Motor Trucks . . . Industrial Power
Refrigerators and Freezers

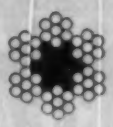
*Tune in James Melton and "Harvest of Stars"*
*NBC, Sunday afternoons*

*ALL NEW, ALL PROVED*

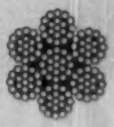
# INTERNATIONAL TRUCKS

INTERNATIONAL HARVESTER COMPANY CHICAGO

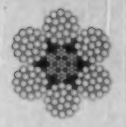
# Whatever the job



**6x7** rope is made with 7 wires in each of 6 strands around a fiber core or a steel core. It may be bright or galvanized steel, stainless steel or monel metal. Uses are for haulage, guying, sand lines, core barrel lines, rigging, controls, etc.

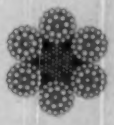


**7x19** is made with 7 strands of 19 wires each, one strand forms the core. It is widely used for corrosion-resisting wire rope of galvanized steel, stainless steel and monel metal. Widely used for aircraft controls and for miscellaneous hoisting and controls.

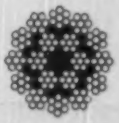


**6x19** classification is made with wire combinations varying from 16 to 26 wires in each of 6 strands. Supplied *PRE* formed or non-*PRE*-formed, Lang Lay or Regular Lay, with fiber core, or steel core in bright and galvanized steel, stainless steel and monel metal. It is one of the most widely used ropes for general hoisting, cranes, excavating equipment, haulage, mining, logging and rotary drilling. Illustrated is a cross-section of 6x19 filler with I.W.R.C.

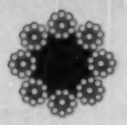
# select the right wire rope for your equipment from



**6x37** group has various types with wire combinations ranging from 26 to 46 wires in each of 6 strands. Supplied *PRE* formed or non-*PRE*-formed, Lang Lay or Regular Lay, with fiber core or steel core. It is extremely flexible and has many uses for hoists, ladle cranes, coal cutting machines, winches, dredges, excavating equipment, etc. Illustrated is a cross-section of 6x41 I.W.R.C.



**18x7** is made as illustrated with 18 strands of 7 wires each and supplied *PRE* formed. It is a non-rotating "Kilindo" rope made by combining two opposing lays of rope. Its principal use is for hoisting with a single line to overcome rotating or spinning of the load. It is desirable for small shop and warehouse electric hoists, and for sewer, subway and mine shaft work.



**8x19** is an extra flexible rope made in various wire combinations. It is used in iron and special traction grades for passenger and freight elevator service, and in Monarch Whyte Strand Improved Plow Steel for many and varied purposes where the rope is not subjected to heavy crushing loads. Illustrated is 8x19 Seale Special Traction Elevator Rope.

*A thousand and one*
## WIRE ROPES
*made by*
## MACWHYTE

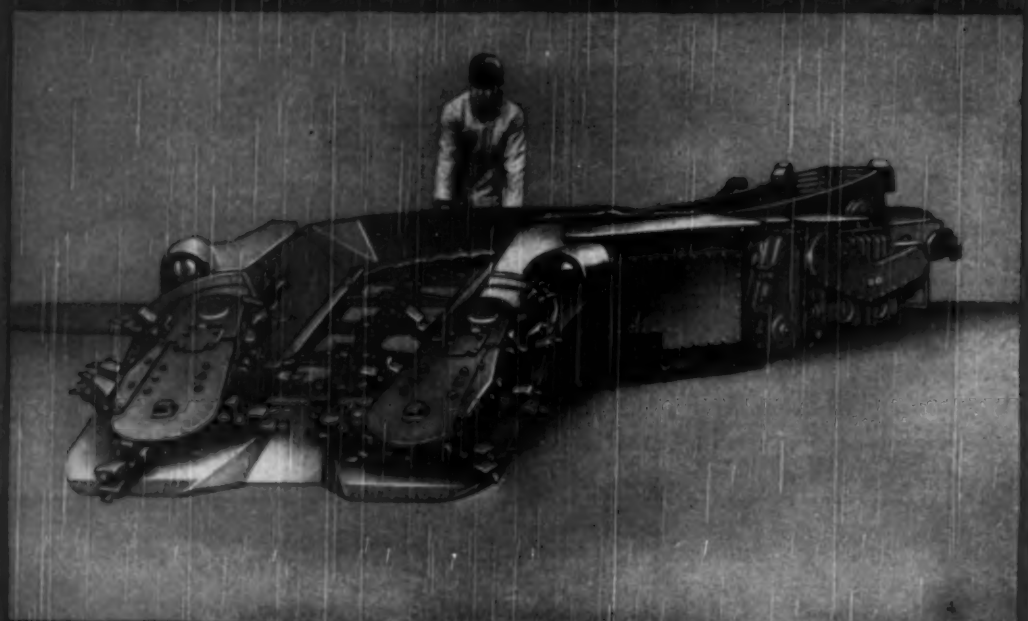
**Putting the right wire rope on your equipment puts dollars in your pocket**

Perhaps you have several uses for wire rope. Perhaps there are several types of rope you could use. But for better service, lowest operating cost, you should get a specific recommendation for each job. Tell us what equipment you have, how you use it, and the size and type of rope you are now using. Take advantage of our specialized wire rope experience with all types of equipment. Get specifications for the correct rope to use on each machine you have. Just call a Macwhyte distributor or write direct to Macwhyte Company, Service Department, Kenosha, Wisconsin.

**MACWHYTE WIRE ROPE**

*MACWHYTE COMPANY 2951 Fourteenth Avenue, Kenosha, Wisconsin Manufacturers of Monarch Whyte Strand PREformed, Internally Lubricated Wire Rope, ATLAS Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal and Stainless Steel Wire Rope. Catalog on request. Mill Depots: New York • Pittsburgh • Chicago • Minneapolis Fort Worth • Portland • Seattle • San Francisco • Los Angeles*

# GOODMAN
# TRACTOR TREAD LOADERS
## TYPE 660



LOW WEIGHT—30 inches overall, 22 inches of coal low.

HIGH CAPACITY — over 8 to 10 tons per minute in free loading coal.

SWIVELING LOADING HEAD — Swings up to 90° each side, with only forward and backward movement, both engine clutches and valves.

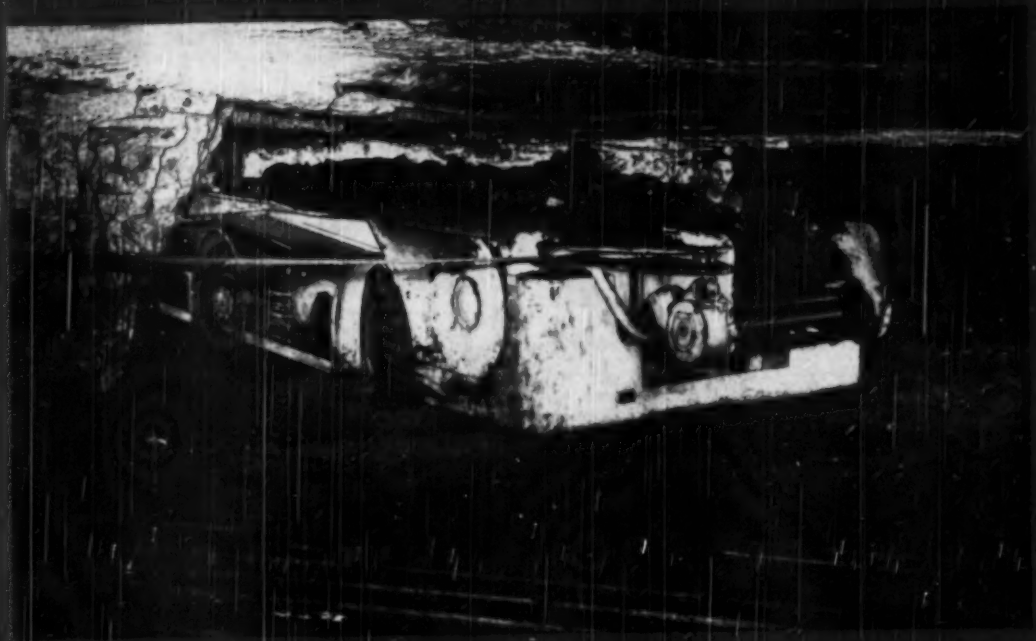
ACCESSIBILITY—all working parts, outboard, yet all are protected for inspection or repair.

LOW MAINTENANCE—a rugged loader for continuous, heavy duty service. Best materials—from top to bottom, end to end—plus expert workmanship, cut your percentage of maintenance upkeep expense.

GOODMAN MANUFACTURING COMPANY

HALSTED STREET AT

# GOODMAN
# SHUTTLECARS
## TYPE 570



48TH • CHICAGO 9, ILLINOIS

50th Anniversary 1900 GOODMAN 1950

# MORE POWER *than ever!*
# GREATER VALUE *than ever!*

**Again in 1950, Chevrolet is the outstanding leader in the entire truck field! Chevrolet brings you more power—and more value—than ever before. *These 1950 P•L trucks are the most powerful trucks Chevrolet has ever built!***

**Chevrolet—and only Chevrolet—leads the field in popularity, performance, payload and price. Chevrolet—and only Chevrolet—has earned the right and proved its right to leadership.**

**See your Chevrolet Dealer today. He sells a P•L truck for every trucking job. And every one gives you MORE POWER . . . GREATER VALUE . . . than ever!**

CHEVROLET MOTOR DIVISION, *General Motors Corporation*
DETROIT 2, MICHIGAN

## Out in front with all these PLus *Features:*

• TWO GREAT VALVE-IN-HEAD ENGINES: the New 105-h.p. Load-Master and the improved 92-h.p. Thrift-Master—to give you greater power per gallon, lower cost per load • THE NEW POWER-JET CARBURETOR: smoother, quicker acceleration response • DIAPHRAGM SPRING CLUTCH for easy action engagement • SYNCHRO-MESH TRANSMISSIONS for fast, smooth shifting • HYPOID REAR AXLES—5 times more durable than spiral bevel type • DOUBLE-ARTICULATED BRAKES—for complete driver control • WIDE-BASE WHEELS for increased tire mileage • ADVANCE-DESIGN STYLING with the "Cab that Breathes" • BALL-TYPE STEERING for easier handling • UNIT-DESIGN BODIES—precision built.

# CHEVROLET
# P*•L*
## ADVANCE-DESIGN TRUCKS

### P*opularity L*eaders
The public's overwhelming preference for Chevrolet trucks is proof of owner satisfaction earned through the years. Beyond question, Chevrolet P•L trucks are the nation's leading choice in the entire truck field.

### P*erformance L*eaders
The new Chevrolet P•L trucks give you high pulling power over a wide range of usable road speeds—and on the straightaway, high acceleration to cut down total trip time.

### P*ayload L*eaders
The rugged construction and all-around economy of Chevrolet P•L trucks cut operating and repair costs—let you deliver the goods with real reductions in cost per ton per mile.

### P*rice L*eaders
From low selling price to high resale value, you're money ahead with Chevrolet trucks. Chevrolet's rock-bottom initial cost—outstandingly low cost of operation and upkeep—and high trade-in value—all add up to the lowest price for you.

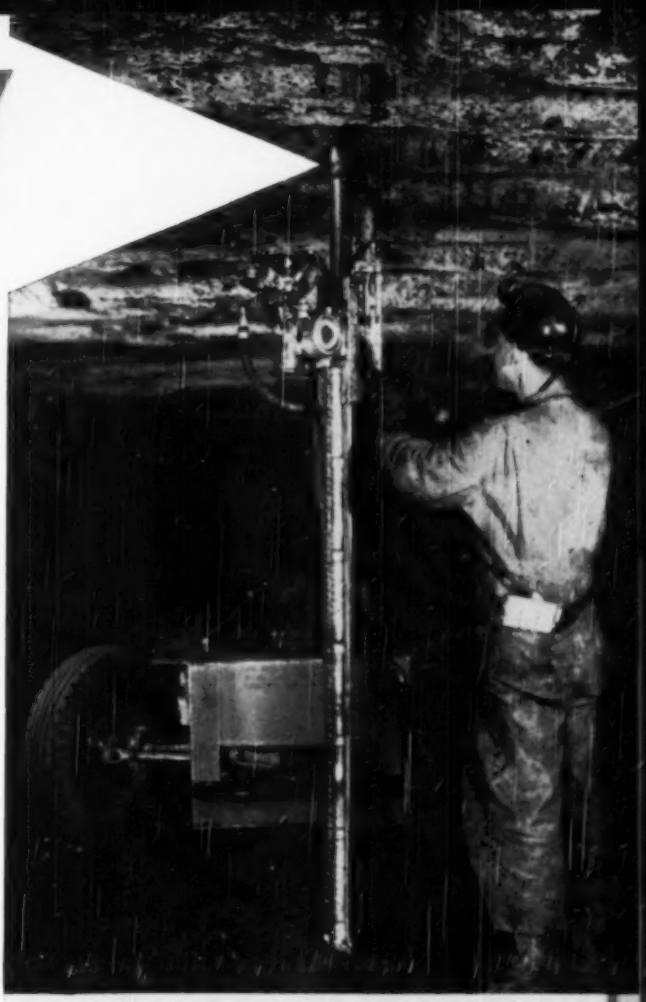
CHEVROLET

# JOY

# ROOF-BOLTING EQUIPMENT

## Backed by 50 years of Drill and Compressor experience for all-around

*BEST PERFORMANCE!*



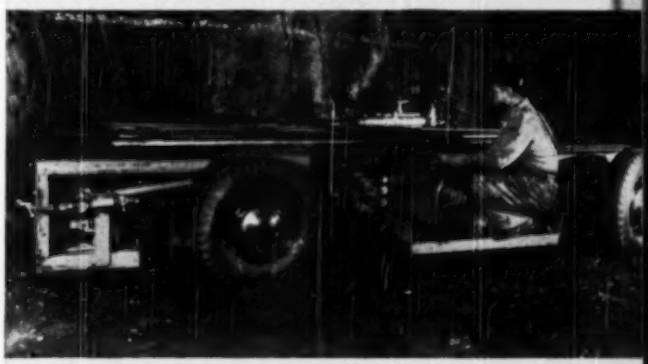
*Above, bottoming a hole with a JOY CFS Chain Feed Stoper. Other JOY Roof-Bolting Drills are the SAE-91, with telescoping compressed air feed leg, and a new rubber tire mounted stoper.*

### JOY Stoper Drills

JOY Stopers do the entire roof-bolting job: drill the hole, drive the bolt and wedge, and tighten the nut. They are available in a complete range of sizes down to 21″, all cadmium-plated for better storage and easier run-in. As another exclusive feature, all have the JOY Dual Valve which makes air do more work, gives faster, more efficient drilling.

### JOY Mine-Air Compressors

JOY Mine-Air Compressors are heavy-duty, permissible units, air cooled, two stage—highly efficient. They are available in capacities from 130 to 240 CFM, in heights from 30″ to 34″, in rubber-tire or track models, and in either self-propelled or draw-bar types.



*A JOY WK-83 Mine-Air Compressor, rubber-tired and self-propelled, and with ample space to carry the drill, steels, and a full shift's supply of bolts, wedges, etc.*

**Write for Bulletins or**

*Consult a Joy Engineer*

WBD CL 2918

# JOY MANUFACTURING COMPANY

**GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.**

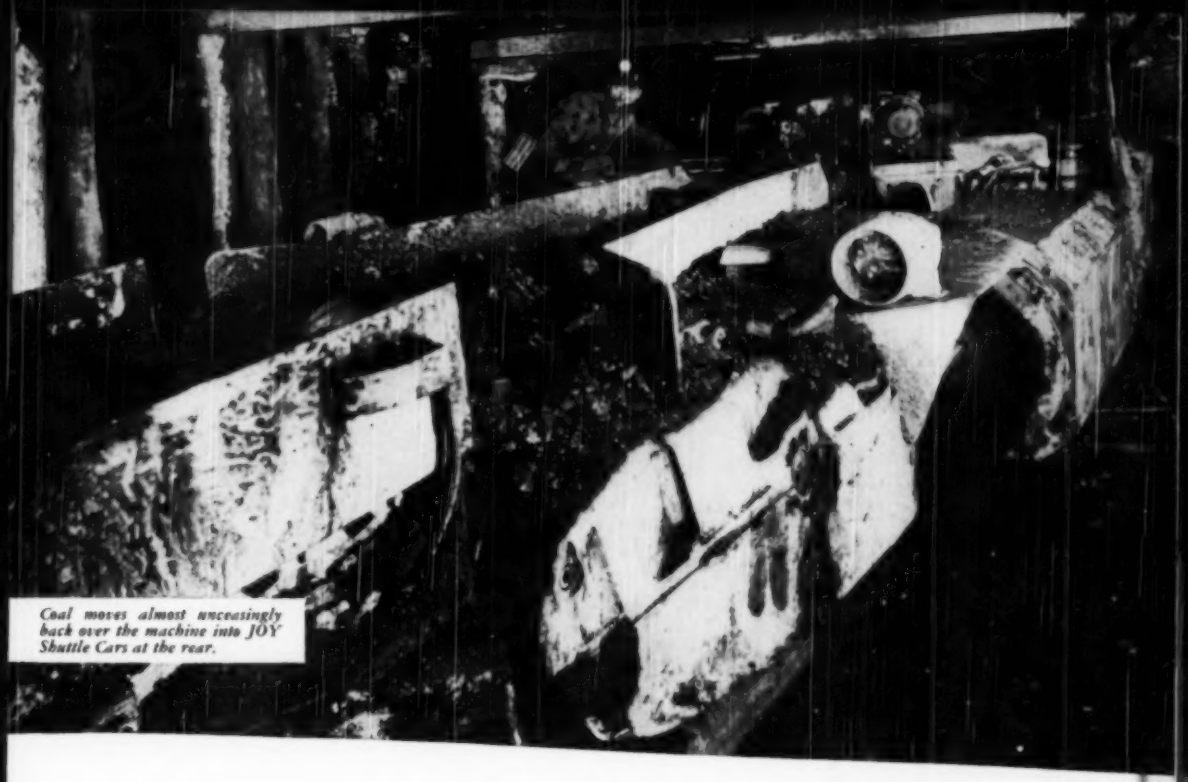
IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

*The "JCM" is really flexible—a tonnage producer in any normal bedded deposit, thin or thick.*

# You can use the JOY

**Carry your coal away from the Continuous Miner with**

**JOY SHUTTLE CARS and BELT CONVEYORS**



*Coal moves almost unceasingly back over the machine into JOY Shuttle Cars at the rear.*

# CONTINUOUS MINER

## IN ANY MINE IT WILL ENTER

★ *FOR GREATEST TONNAGE OUTPUT!*

★ *FOR LOWEST OPERATING COSTS!*

Write for Bulletins or *Consult a Joy Engineer*

W&O CL 2029

# JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

*A JOY Belt Conveyor providing efficient, reliable main haulage.*

# JOY BELT CONVEYORS

## FOR GATHERING OR MAIN HAULAGE

*This team moves tonnage fast—a JOY Shuttle Car with elevating discharge unloading onto a JOY Belt Conveyor.*

JOY Belt Conveyors do a highly capable, low cost transporting job, whether out of the entries or over the long haul. Rugged construction, sealed precision bearings which require no lubrication for life, and low power consumption are features that mean efficient, trouble-free operation . . . a smooth uninterrupted flow of coal with no waiting for empties, no matter how long the haul. ● Wherever you need a belt conveyor (or chain and shaker types) use *proved JOY* Equipment for *best* results.

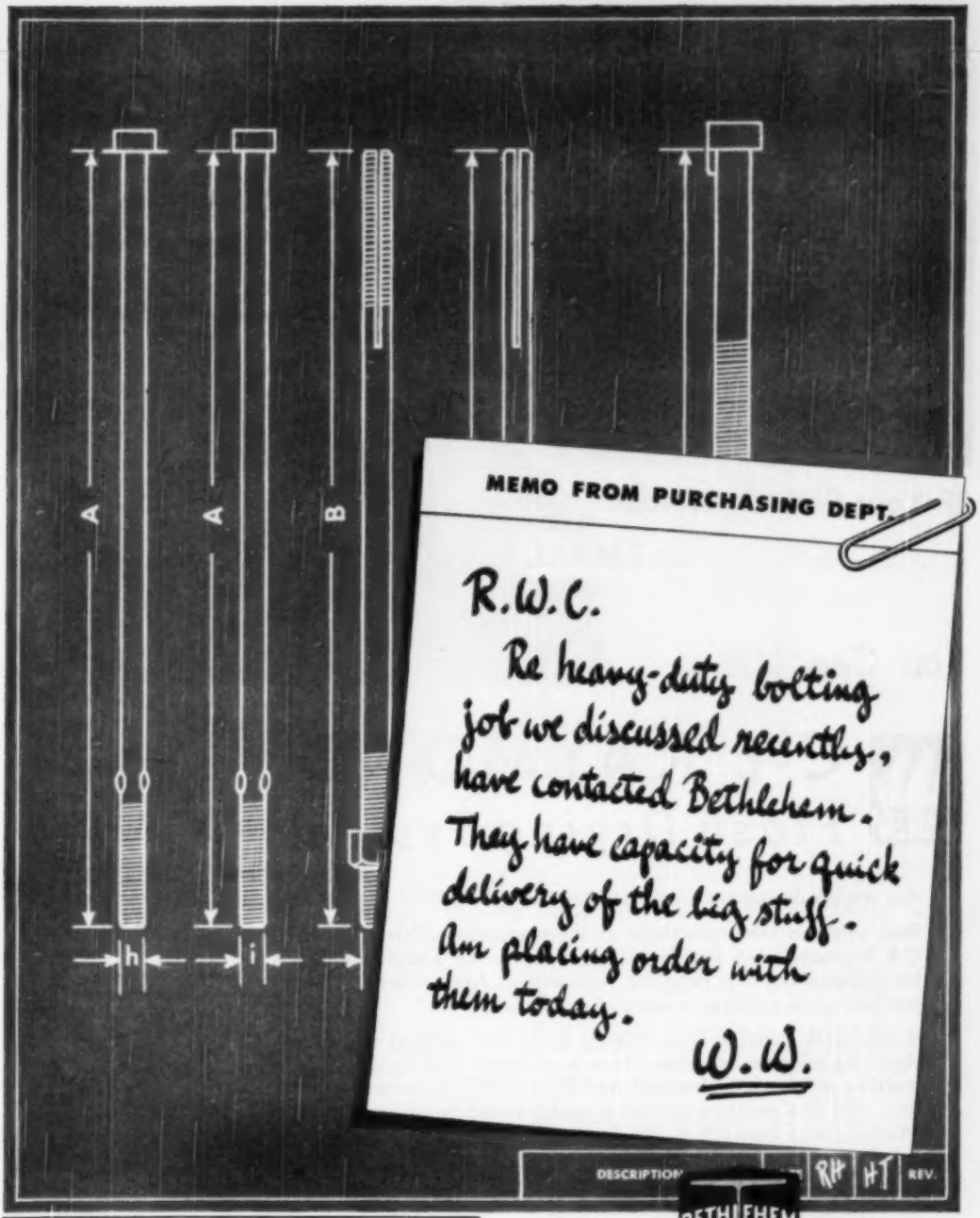
*Consult a Joy Engineer*

W&D CL 2921

# JOY MANUFACTURING COMPANY

**GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.**

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO




*Bethlehem Fastenings for the Mine*

SPIKES TRACK BOLTS RIVETS
U-BOLTS THREADED RODS
ROOF BOLTS AND ACCESSORIES
STANDARD BOLTS AND NUTS

BETHLEHEM STEEL

**BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.**

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

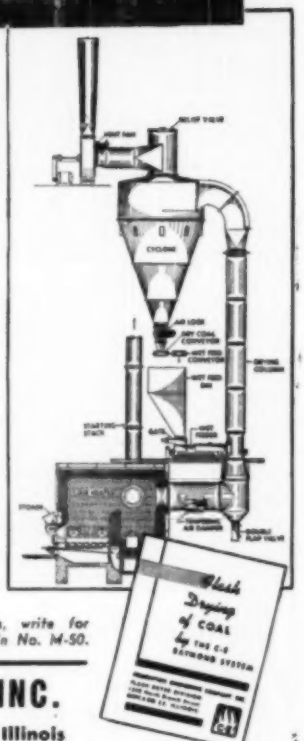
*Export Distributor:* Bethlehem Steel Export Corporation

IF Your Plant is **LARGE**

or **SMALL**

*You Can Use . . .*

# C-E RAYMOND
## *Flash Drying System*




Are you producing fine coal sizes between ⅜" x 0"?

Then you can take advantage of the economies offered by the C-E Raymond Flash Drying System, because this equipment may be designed for any capacity requirements from around 7 tons per hour up to 175 tons or more of dried coal.

It will handle initial surface moisture up to 12% without recirculation. By using recirculation, there is no upper limit to the initial moisture which can be handled, and 25% to 30% is common practice. The final moisture content is readily varied to suit conditions. This will range from 0% to 3% in most installations.

Various size plants all over the U. S. are using C-E Raymond Flash Drying Systems with great success, and many are putting in repeat installations for plant expansion programs.

*For further details, write for Flash Drying Bulletin No. M-50.*

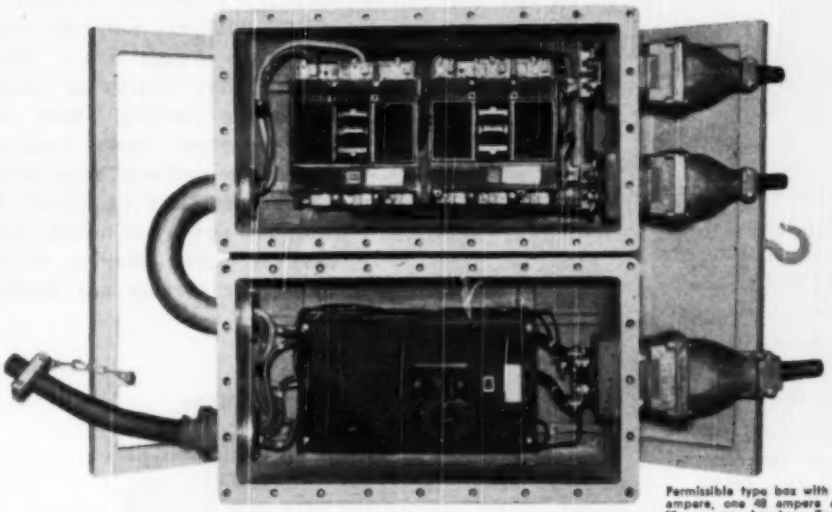
**COMBUSTION ENGINEERING-SUPERHEATER, INC.**

**FLASH DRYER DIVISION** **1315 North Branch St., Chicago 22, Illinois**

# ENSIGN

## NEW POWER *Distribution Boxes*

**Permissible and Dust-Tight . . . with ENSIGN Safety Lever Action Plugs . . . Metal Clad . . . Only Three Wires Used.**



Permissible type box with one 225 ampere, one 40 ampere and one 60 ampere breaker. Top view, covers removed.

• GENERAL CONSTRUCTION — Enclosures for Permissible Types are constructed of heat treated Aluminum Alloy Castings of high tensile strength. Covers are of heat treated Aluminum Alloy Plate. Dust-tight enclosures are constructed of steel, formed and welded for rigidity.

### ELECTRICAL FEATURES

• ENSIGN Distribution System employs New Safety Plugs which can be disengaged under load.

• NEW Electrical Circuit (Patent applied for) used for interlocking and tripping breaker.

• Boxes incorporate three-pole De-Ion circuit breakers with shunt trip attachments for tripping breaker plus ground current limiting device built into the breaker.

• Any combination of circuits may be provided in either Permissible or Dust-Tight enclosures. Failure of power supply does not trip breaker when shunt trip attachment is used—saving many man hours; furthermore, no circuit is broken outside the enclosure.

• Only three (3) wires are used—Positive, Negative and Safety Ground—no special cables are required.

***For full particulars write for bulletin "ENSIGN DISTRIBUTION BOXES"***

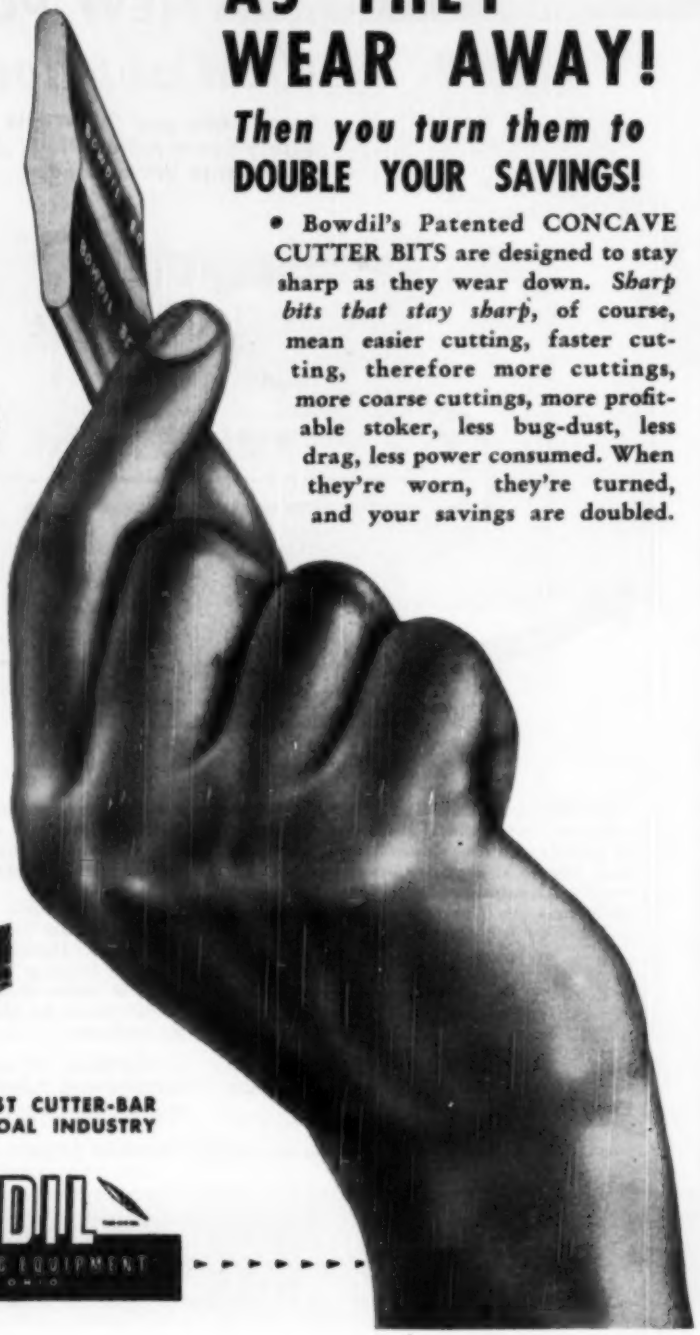
**ENSIGN ELECTRIC & MANUFACTURING CO.**
HUNTINGTON, WEST VIRGINIA

# THE BITS THAT STAY SHARP AS THEY WEAR AWAY!

U. S. PATENT NO.
2,217,347

## *Then you turn them to* DOUBLE YOUR SAVINGS!

• Bowdil's Patented CONCAVE CUTTER BITS are designed to stay sharp as they wear down. *Sharp bits that stay sharp*, of course, mean easier cutting, faster cutting, therefore more cuttings, more coarse cuttings, more profitable stoker, less bug-dust, less drag, less power consumed. When they're worn, they're turned, and your savings are doubled.



• Whatever type of bit you are using now, it will pay you to test Bowdil's CONCAVE BITS. They cost so little, there's no economy in re-sharpening bits of any kind. Ask Bowdil's representatives, or write or call the factory at Canton, Ohio.

• For thirty years, bit orders have been shipped the day they are received.

*Made by the makers of the*

STRONGEST CUTTER-BAR IN THE COAL INDUSTRY

BOWDIL
COAL CUTTING EQUIPMENT
CANTON OHIO

*Save* on maintenance costs

*Simplify* lubricant storage and handling

*Eliminate* application errors at the face

*with*

# Gulf Mining Machine Lubricant B

This outstanding lubricant for cutting and loading machines offers effective help in your efforts to increase tonnage and reduce costs. Here's how:

Gulf Mining Machine Lubricant B provides better lubrication—wear is reduced.

Lubricant storage and handling is simplified because Gulf Mining Machine Lubricant B does the job of two or three other lubricants—provides effective lubrication for both plain and anti-friction bearings and for gears in drives and transmissions.

Application errors are avoided at the face because in most cases you need only Gulf Mining Machine Lubricant B and a hydraulic oil—Gulf Journal Oil.

Call in a Gulf Lubrication Engineer today and ask him to demonstrate the time-saving, cost-cutting advantages of this quality lubricant. Write, wire, or phone your nearest Gulf office.

**Gulf Oil Corporation • Gulf Refining Company**

GULF BUILDING, PITTSBURGH, PA.

Sales Offices • Warehouses

Located in principal cities and towns throughout Gulf's marketing territory

GULF INDUSTRIAL LUBRICATION

# *Top producer*

## of them all . . .

# *McCarthy Drills*

**Hundreds of successful operators rely on McCarthy Drills for their really tough jobs, because they know McCarthy Drills produce more footage at less cost in less time! These rugged machines have proved themselves in every test under the most difficult conditions. List of owners furnished on request.**

### SELF-PROPELLED HORIZONTAL DRILL

**These tough, maneuverable units produce 40% more 6 to 8-inch blasting holes per day as they move about under their own power from hole to hole in the pit. The hydraulically controlled carriage travels a distance of seven feet, eight inches to provide ample clearance for the addition of six-foot auger extensions. Drills holes up to a horizontal depth of 120 feet. Finger tip control permits selection of any drilling speed up to six feet per minute and four individual self-locking jacks maintain correct drilling level during operation. Over-all length: 12 feet. Width: 5 feet, 8 inches.**

### VERTICAL DRILL

**Here's a real time-saver for blast hole drilling of 6 and 8-inch holes practically designed for truck, half-track or caterpillar tractor mounting. The eight-foot tower is raised and lowered by hydraulic power and, when in traveling position, its over-all height is only seven feet, four inches. The auger is driven by an alloy shaft connected by a flexible chain coupling. The upper shaft section is 2½ inches square and drives through a lubricated sleeve located on top of the tower. Total weight: 4800 pounds.**

### COAL RECOVERY DRILL

**This machine is specifically built for recovering coal after further strip mining is unprofitable. A three-man crew can easily drill to depths of 100 feet or more. With 16, 20, 24, 30, 36 or 40-inch augers, a McCarthy Drill will produce from 60 to 150 tons of clean coal every eight hours for a total cost, including depreciation, of less than $1.50 per ton! A special steel-geared reduction unit, running in oil on Timken Bearings, transmits power through the heavy-duty transmission. Four speeds forward, one reverse are provided and the carriage travels a distance of eight feet. Over-all dimensions: 6 feet by 14 feet long. Total weight: 4700 to 5000 pounds. See your McCarthy Dealer today or write us direct for information.**

**Six-cylinder gasoline engine standard on all drills. Diesel or electric power units can also be supplied.**

*Manufactured by*

## The SALEM TOOL Co.

763 S. ELLSWORTH AVE., SALEM, OHIO, U. S. A.

"FOR LONGER WEAR... LESS REPAIR"
JALLOY
HEAT TREATED FOR MAXIMUM ABRASION and IMPACT RESISTANCE
J&L STEEL
JONES & LAUGHLIN STEEL CORPORATION

# J&L STEEL

**This book tells**—*with facts and figures*—just how JALLOY Steel saves money for companies like these:

KELLEY'S CREEK COLLIERY CO.
INTERSTATE IRON CO.
MASSAPONAX SAND & GRAVEL CO.
STUART M. PERRY CO.

## Learn how others SAVE MONEY with J&L JALLOY Steel

*Is abrasion eating up YOUR PROFITS?*

**JALLOY** heat-treated plate is the steel that is saving users' money through *longer wear . . . less repair.* Every design engineer, operating man and maintenance superintendent should have a copy of this 36-page, illustrated book that shows how much longer JALLOY Steel lasts where abrasion and impact limits the life of equipment. The coupon at the right may help you change losses into profits.

**MAIL IT TODAY!**

## Get this book FREE

Jones & Laughlin Steel Corporation
411 Jones & Laughlin Building, Pittsburgh 30, Pa.

Without obligation, send me a FREE copy of "JALLOY—J&L Special Alloy Steel," the book that tells how I can reduce maintenance cost through *longer wear . . . less repair.*

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

# MAKING A **TOUGH** CABLE

## Tougher!!

**Stripping off the lead sheath after a Tirex Cable has been "Cured-In-Lead"**

... That's what the "Cured-In-Lead" process is doing for every TIREX portable cable — adding extra wearability to their Selenium Neoprene Armor to assure long, trouble-free service under the most severe operating conditions.

**HERE'S HOW IT'S DONE**

Before jacket vulcanization the cable is run through a lead press which forms a lead "pipe" snugly around the jacket. During vulcanization this pipe firmly holds the cable, preventing any distortion of the jacket while it is still soft and pliable and assuring maximum density. When vulcanization is completed the lead is stripped off leaving an extra-tough jacket that needs no additional protection.

**HERE'S WHAT IT DOES**

It produces a jacket that is unexcelled for effective resistance to abrasion and rough handling ... provides it with a smooth outer surface which slides easily around obstructions without cutting or tearing ... maintains uniform diameter, assuring easy and compact reeling or coiling ... furnishes the means for positive identification of the size, type, number of conductors, and operating voltage of each cable as markings inside the lead pipe can be transferred to the jacket during vulcanization.

All TIREX Cables, and TIREX Cords too, are cured in lead. They are made in sizes and types to meet the requirements of all portable electric equipment. For a complete description of the "plus values" they provide, write us today for Folder 993.

**SIMPLEX-TIREX**

SIMPLEX WIRE & CABLE CO.
79 Sidney Street
Cambridge 39, Mass.

# Here's Fast, Efficient Coal Grading, at 526 Tons an Hour!

HERE, IN Pittsburgh Coal Co.'s (Division of Pittsburgh Consolidation Coal Co.) Mathies cleaning plant, this battery of six 6 x 16 ft single deck *Ripl-Flo* screens with stationary dust enclosures remove a ⅜ x 0 product from a feed of 624 TPH of 2 x 0 raw coal.

Circular motion to every part of screen deck results in rapid stratification and high capacity, with no "dead" spots anywhere on screen surface.

Another reason this coal company chose *Ripl-Flo* screens — they're built with only two bearings instead of four. Width is reduced 17%; weight by as much as 36%! Think what that means in terms of low maintenance and operating costs.

*Ripl-Flo* vibrating screens have proved a good investment for all these coal applications:

- **Pre-sizing raw coal ahead of cleaning units.**
- **Final sizing and re-screening to egg, range, nut and stoker grades, with 2, 3 or 4 separations.**
- **Refuse sizing and dewatering.**
- **Heavy-Duty *Ripl-Flo* screens handle ROM coal in sizes up to 22 inches.**

The Allis-Chalmers representative in your area will gladly look over your cleaning plant, point out how *Ripl-Flo* screens may reduce your preparation costs. Call him today, and write for **Bulletin 25B6280A**, covering all Allis-Chalmers products for coal. A-2923

ALLIS-CHALMERS, 968A SO. 70 ST.
MILWAUKEE, WIS.

*Ripl-Flo* and *Texrope* are Allis-Chalmers trademarks.

**"TEAM UP" COAL PROCESSING EQUIPMENT WITH A *COMPLETE* ALLIS-CHALMERS DRIVE!**

Motors — Controls

Texrope Drives

**OTHER COAL EQUIPMENT**

Vibrating Screens

Centrifugal Pumps

Hoists

Rectifiers

# ALLIS-CHALMERS

McNally Pittsburg now offers a

# "Packaged"

## COAL CLEANING PLANT

*America's only Baum-type Unit Washer*

End View Cross Section of
McNally-Norton Unit Washer

**The complete Washer Unit and the building addition to your plant to house the washer. The McNally Unit Washer handles coal from 5″ to 0, in tonnages from 30 to 100 tph. Fully automatic, embodying the Baum jig principle of separating coal from incombustible impurities. Unit delivered complete, ready for erection. In the limited space here, we can only illustrate the "package" Unit idea. Write for details . . . be sure to ask for Bulletin 216.**

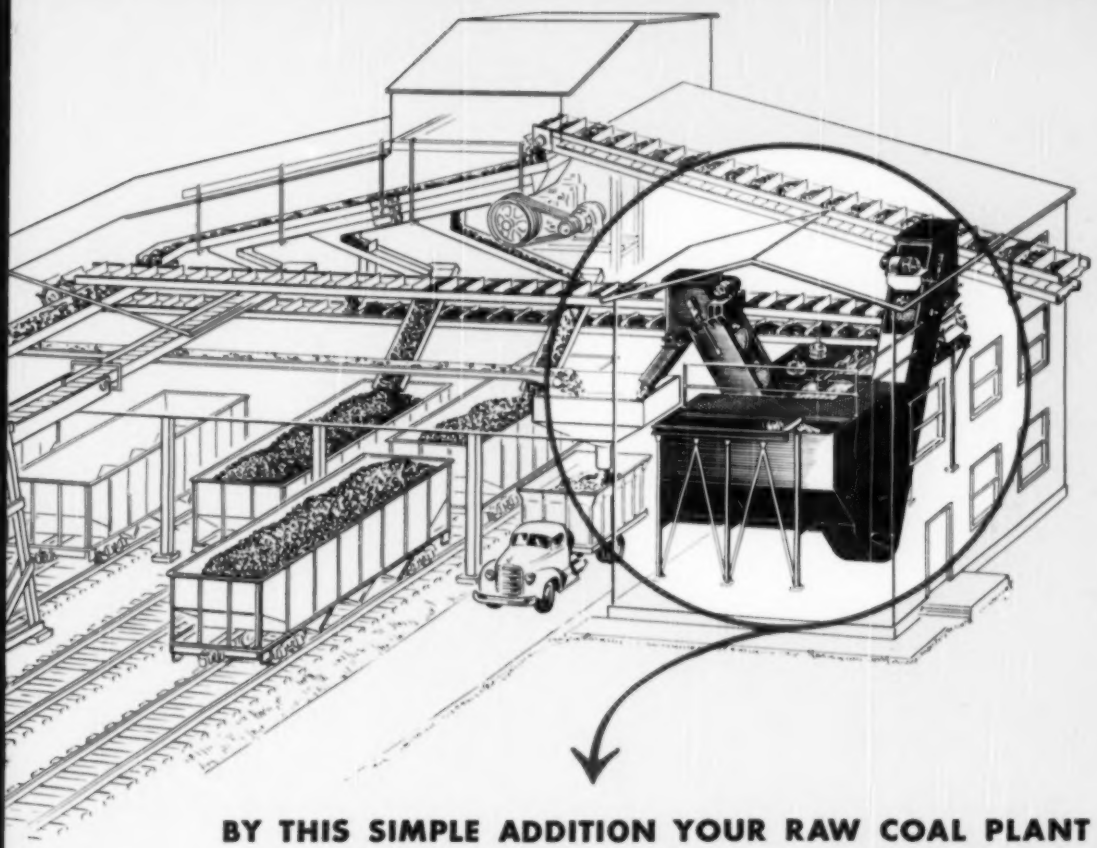
## WHEN ADDED TO YOUR PRESENT BUILDING . . .
## the Architectural Design of the Housing Unit Will Match Your Building Styling

**Our technicians will be glad to explain how you can make this addition to your plant so that you can really get into the market and land your share of the orders for premium value fuel.**

# *Here's What's in the Package...*

## HELP FOR SMALLER TONNAGE OPERATORS

*who want to get in the market and stay there*



## BY THIS SIMPLE ADDITION YOUR RAW COAL PLANT CAN CAPTURE MARKETS FOR WASHED PREMIUM FUEL

**McNALLY PITTSBURG**

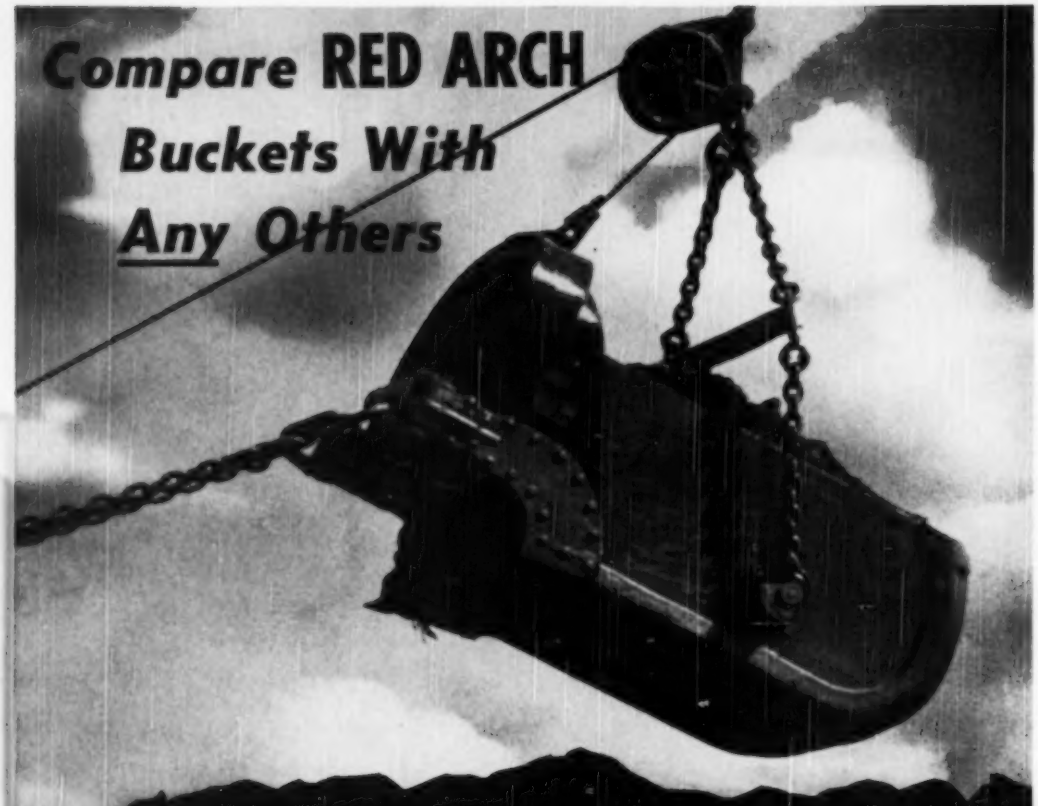
MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

**Washer and Housing Unit are offered in one "package." With it, you add to your screening plant a washing section to upgrade your coal. With this equipment, you can meet your customers' most exacting specifications. You gain all the advantages of the same washing principles, the same rejection principles, as the big plants with washing requirements up to 2000 tph.**

McNally Pittsburg Manufacturing Corporation—*Manufacturing Plants:* Pittsburg, Kansas • Wellston, Ohio

*Engineering and Sales Offices:* Pittsburgh • Chicago • Rio de Janeiro • Pittsburg, Kansas • Wellston, Ohio

# Compare RED ARCH Buckets With Any Others



## on Performance

Watch a RED ARCH dragline bucket work. Note how correct angling of teeth and cutting edge lets the bucket bite in fast, how the high arch lets the load flow in to heaping. Note the smooth balanced carry that cuts bobbing and spilling. Watch the clean, fast dump. Check the load volume, the cycle time — you'll find it's hard to beat a RED ARCH pass for pass.

## on Maintenance Economy

Ask owners about the maintenance records of their RED ARCH buckets. You'll see that a RED ARCH stays on the job and out of the shop — that upkeep costs and lost time are 'way down.

## on Bucket Life

Ask owners, too, about RED ARCH life expectancy. You'll find that RED ARCH buckets stand up much longer because they're designed for long wear *and* strength . . . because they're built of specially developed alloy steels, specially processed.

## on Long Range Output

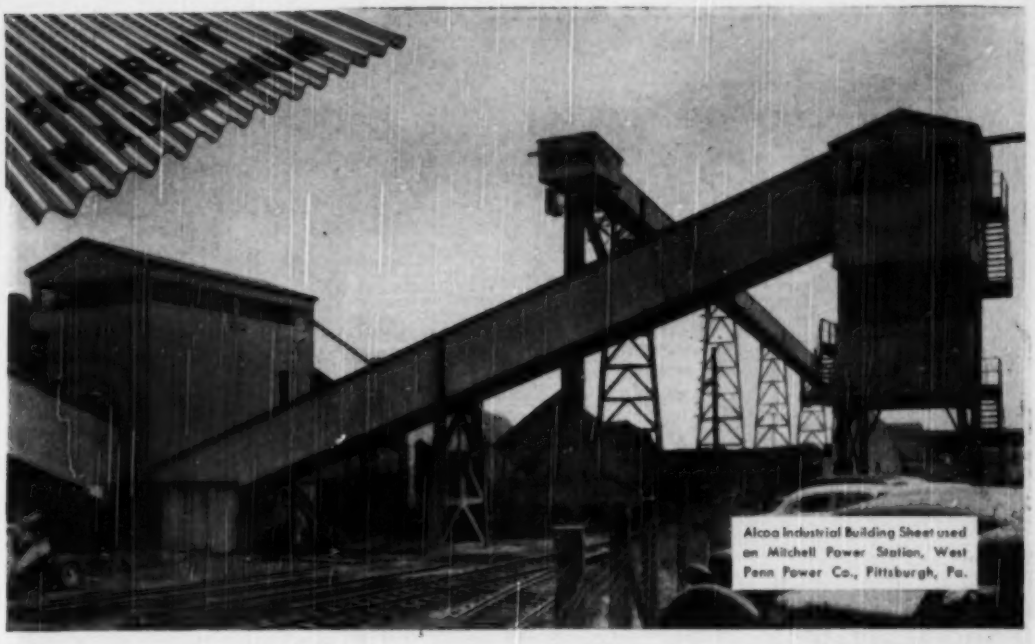
Check RED ARCH output over the "long pull." You'll see that these buckets pile up bigger yardages because they're ahead in performance, in maintenance economy, in bucket life.

***Write for Complete Information!***

Three Types Available — for medium, medium heavy, and heavy duty digging. ¾ to 30 cu. yds.

**BUCYRUS-ERIE COMPANY**

South Milwaukee, Wisconsin



Alcoa Industrial Building Sheet used on Mitchell Power Station, West Penn Power Co., Pittsburgh, Pa.

# FOR PLACES YOU DON'T EVER WANT TO PAINT

***Alcoa Industrial Building Sheet gives long life and freedom from maintenance***

Faced with the problem of selecting roofing and siding that would stand up in corrosive atmospheres; require a minimum of maintenance . . . West Penn Power Co. specified Alcoa Aluminum Building Sheet . . . used it to cover conveyors, machinery sheds and utility buildings. "Resistance to corrosive coal dust and freedom from painting", dictated the choice according to the owners.

Easy to put up in hard-to-get-at places, Alcoa Industrial Building Sheet weighs only 56 lbs. per hundred square feet, can be erected quickly over steel or wood by all standard fastening methods. Low in first cost, it keeps maintenance costs down, too. Keeps its good appearance; resists corrosive effects of industrial smoke and fumes.

For data on application, prices and accessories, call your nearby Alcoa Sales Office, or mail the coupon at the right.

**FACTS FOR BUILDING OWNERS AND MANAGERS**

*Low Cost*— Alcoa Industrial Building Sheet is low in first cost. Keeps upkeep costs down, too. Can't rust away. Needs no painting.

*Tough and Strong*—2.5 years on coal tipples, hasn't affected the serviceability of Alcoa Building Sheet. With 4' purlin spacing it will support 80 p.s.f. uniform load (safety factor: 2).

*Available*— Prompt delivery from convenient suppliers. All types of fasteners and flashing accessories in stock.

**For complete details MAIL THIS COUPON, TODAY**

**Aluminum Company of America**
**1469D Gulf Bldg., Pittsburgh 19, Pa.**

Please send me engineering and application data on Alcoa Industrial Building Sheet.

Name_____

Company_____

Address_____

City_____ State_____

**ALCOA** INDUSTRIAL BUILDING SHEET

ALCOA ALUMINUM

INGOT • SHEET & PLATE • SHAPES, ROLLED & EXTRUDED • WIRE • ROD • BAR • TUBING • PIPE • SAND, DIE & PERMANENT MOLD CASTINGS • FORGINGS • IMPACT EXTRUSIONS ELECTRICAL CONDUCTORS • SCREW MACHINE PRODUCTS • FABRICATED PRODUCTS • FASTENERS • FOIL • ALUMINUM PIGMENTS • MAGNESIUM PRODUCTS

## FOR ACCURATE GAGE AND ALIGNMENT . . .

# Bethlehem Turnout Tie Sets

This photograph shows an example of good alignment and accurate gaging in mine track. It's a Bethlehem No. 2 Turnout equipped entirely with steel ties, spaced as recommended.

All are regular ties except for the following six: the extended pair used with the switch and switch stand; the one under the switch heel; the one 14 in. beyond the heel; and the two under the frog. These six are special models with riveted and welded construction. The frog ties can be made for guard rail attachment when guard rails are specified.

The regular ties used in the system, including the interlaced group, are equipped with the familiar Bethlehem outside stationary and inside rotating clips, which make installation but a matter of seconds.

A turnout like the one shown, using Bethlehem steel ties of the recommended sections and types, is quickly and easily put together; in many cases, it can be assembled in *less than two hours*. No special track crew is needed. Once installed, this turnout is safer, because of the accurate gage and alignment; requires less maintenance, for every component is designed and machine-made for the job it has to do. You have here a system that completely eliminates the hit-or-miss element.

Why not ask Bethlehem to help you plan your layout? It's a service rendered by engineers of long experience — men who will make an exhaustive study of your mine and its track needs, *at no extra cost*. Say when, and a Bethlehem representative will call.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
*Export Distributor:* Bethlehem Steel Export Corporation

★ BETHLEHEM STEEL ★

These Two Valuable "Tools" of

# V-BELT DRIVE

## Design and Application

## . . . are *Yours* for the *Asking!*

**The Gates "GUIDE for SELECTING or DESIGNING V-BELT DRIVES" is widely recognized as the most *comprehensive* and *complete* book of its kind—and also the *easiest to use*. It enables you to find all the possible combinations of stock drives for your machine with the *least amount of calculation*—and almost *automatically* gives you the drive of *lowest price* that will be adequate for the job.**

### Saves You Time, Work and MONEY

**The GUIDE tells all about "Design Horsepower" and Speed Ratios—and by merely *scanning* a page of GUIDE designs which use the *stock pulleys* that meet your needs, you can quickly determine the center distances that will fit your equipment layout while, at the same time, enabling you to use *standard belts!***

### You Can Design ANY Drive

**The Gates GUIDE tells *when* you can use a *V-Flat* drive—and gives you a simple way to choose a practical V-Flat design using *stock* driver sheave with whatever flat pulley you may already have on hand.**

**As a matter of fact, by using the Gates GUIDE you can design—with a *minimum of calculation—any kind* of V-Belt drive for every kind of operation—including quarter-turn drives and Dubl-V drives.**

### Written By GATES Engineers

**The GUIDE is compiled and written by Gates Engineers. It embodies their specialized knowledge gained through operating the largest V-Belt testing laboratories in the world! Here, an average of *32,000 hours* of testing *per week* are run on V-Belts alone! No wonder the Gates "GUIDE for SELECTING or DESIGNING V-BELT DRIVES" is regarded by Engineers as the *authority* on V-Belt Drive design.**

### Also, A Monthly Report of All That's *New* and *Progressive*

**The Gates "INDUSTRIAL NEWS," published monthly, gives interesting "case histories" of V-Belt drive installations designed and used by practical operating men and engineers. These case histories are selected from thousands of applications. Among other things they show — what can be accomplished with V-Belts — how to install various drives—unique applications—unique uses — examples of savings — and other valuable "how-to-do" ideas.**

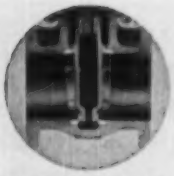
**Whether you are a practical operating man or a design engineer, you can save much time, hard work and money by having these useful Gates publications. Just ask for them—using the coupon below. They will be sent to you without cost or obligation of any kind!**

Eng. 501

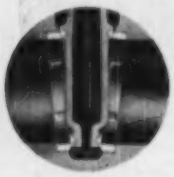
Gates VULCO ROPE DRIVES
IN ALL INDUSTRIAL CENTERS

THE GATES RUBBER COMPANY
World's Largest Makers of V-Belts
DENVER, U.S.A.

The Gates Rubber Company
[illegible] So. Broadway, Denver 17, Colorado
I would like you to send me without cost or obligation—
☐ The Gates "GUIDE for SELECTING or DESIGNING V-BELT DRIVES."
☐ Gates "INDUSTRIAL NEWS," published monthly.
Name _____
Position Held _____
Name of Firm _____
City _____ State _____



**Straight-Flow Port Design** reduces fluid turbulence to a practical minimum.



**Seat Rings** of end-seated type are screwed into the body.

**Sure-Grip Malleable Handwheel** for non-skid gripping even with heavy gloves.

**Brass Liner on Glands** assures greater resistance to corrosion and scoring.

# WALWORTH

# iron body gate valves

**with screwed or flanged ends**

## ... 8 Outstanding Features

For complete information on these new Walworth Iron Body Valves, see your local Walworth distributor, or write for bulletin 106.

# WALWORTH

## valves and fittings

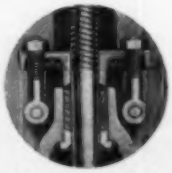
60 EAST 42nd STREET NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

**T-head Disc-to-Stem** connection on OS&Y types provides stronger connection, prevents loosening of disc by corrosion.

**Bronze Back-Seat Bushings** in bonnets of OS&Y valves.

**Solid Web Type Disc** in OS&Y valves for greater strength and longer service.

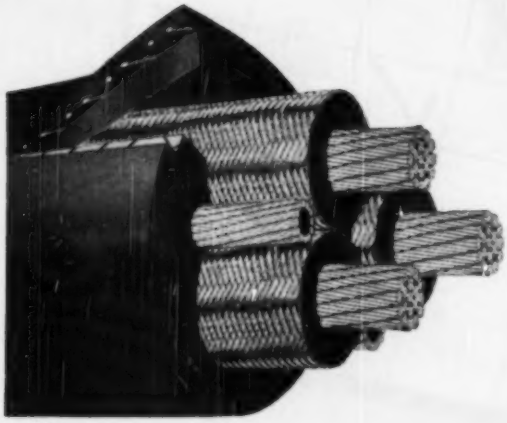


**Hinged Gland Eye-Bolts** on OS&Y valves permit faster, easier repacking under full pressure.

# It's Butyl-Insulated!

# SECURITYFLEX type SHD

## Better for your high-voltage, heavy-duty big shovel jobs!



The newly improved Securityflex* Type SHD is better because it's BUTYL-INSULATED for superior electrical and mechanical characteristics. It stands up better under compression and mechanical abuse, has increased moisture resistance and much higher heat resistance (rated at 80°C.).

*Better because it has a new "copper-cotton" combination shield that*

- **means faster, easier splicing**
- **eliminates chafing failures**

*Better because the patented grounding wires are rubber-cored. That means grounding wires that*

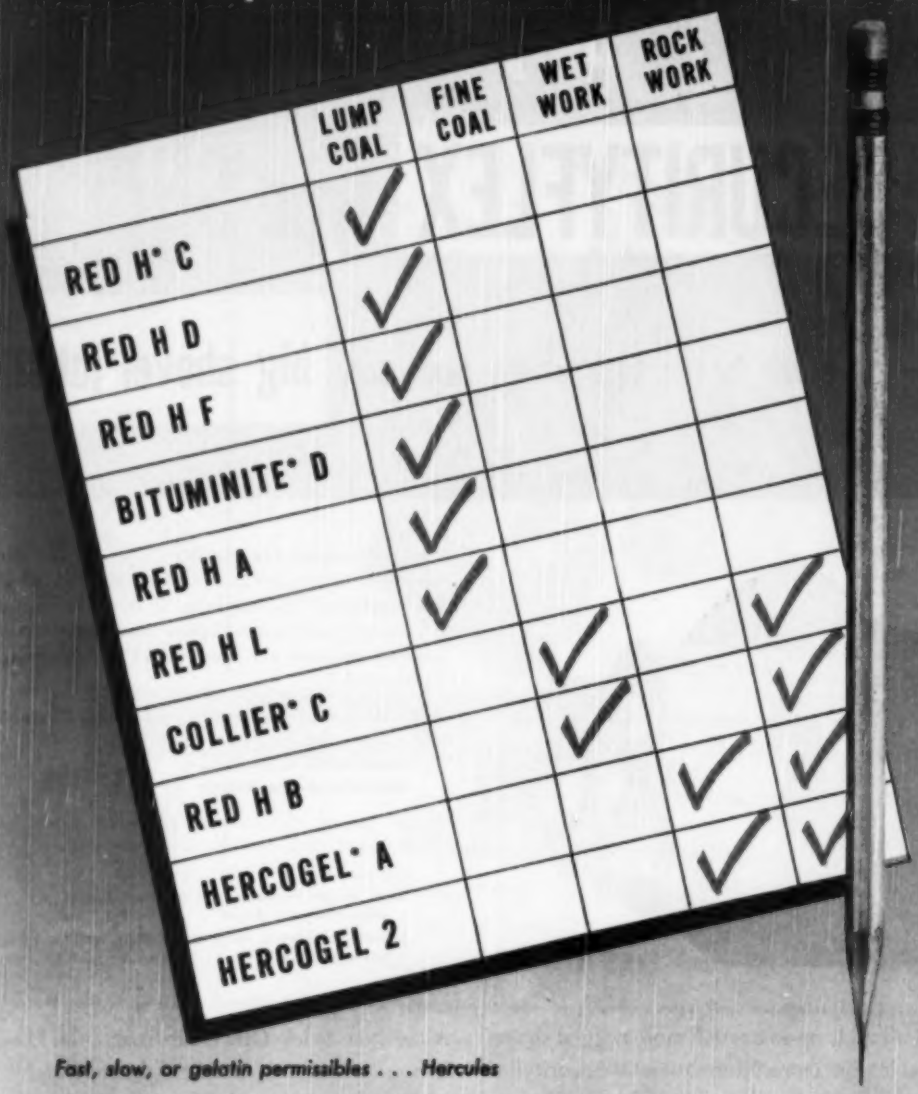
- **will not kink**
- **have larger diameter for greater contact with conductor shield**
- **provide cushioned construction that won't cut insulation**

It all adds up to a much more rugged shovel cable. For more information on Securityflex Type SHD, get in touch with your nearest Anaconda Sales Office or Anaconda Distributor. Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York. 6031A

*Reg. U. S. Pat. Off.

## the right cable for the job ANACONDA® WIRE AND CABLE

# Check the permissible best suited to your job




*Fast, slow, or gelatin permissibles . . . Hercules can supply you with the correct explosive for any coal mining need. You can quickly determine which suits your requirements most effectively and economically.*

**HERCULES POWDER COMPANY** 936 King Street, Wilmington 99, Delaware

*REG. U. S. PAT. OFF.

XR50-4

*Designed for Greater Range and Capacity*

# LIMA 2400

This big machine is engineered and constructed for extra-heavy duty. It has met with enthusiastic acceptance, and is setting new performance records on coal stripping and mining operations.

Features include: "precision" air control of all operating functions; anti-friction bearings at all vital bearing points including drums, cone rollers and hook rollers; Large, grooved drums—tapered for shovel operations; truck base and rotating base of heavy one-piece annealed cast steel; extra sturdy construction; easy accessibility of all parts requiring lubrication or maintenance; Hamilton Diesel power plant—plus many other features for maximum performance and availability.

The LIMA line includes Shovels ¾ to 6 yards, Cranes to 110 tons, and Draglines, variable. Offices in principal cities of the world.

**LIMA Rubber Mounted Cranes are Available in 20 and 35 Tons Capacity**

6-YARD SHOVEL
•
5-7-YARD DRAGLINE
•
110-TON CRANE

## Lima Shovel and Crane Division

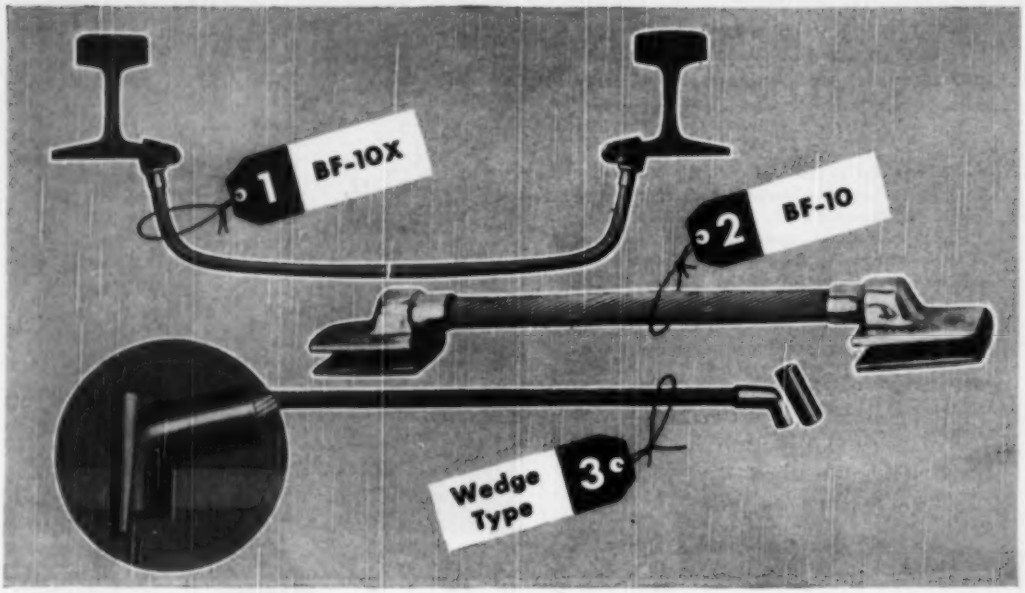
LIMA, OHIO

OTHER DIVISIONS: *Lima Locomotive Works Division; Niles Tool Works Co.; Hooven, Owens, Rentschler Co.*

LIMA HAMILTON CORPORATION

*These 3 bonds are 3 good reasons why*

# U·S·S American Tigerweld Rail Bonds are so popular with maintenance men:




### *1* The BF-10 Bond:

This reversible bond is designed for installation at rail joints of permanent trackage. The strand can be installed atop the rail base, or, for maximum protection against derailment, under the rail base. The BF-10 Bond is self-clamping . . . application of the bond, including the forming of the strand, can be effected without the aid of clamps or other holding devices before welding. And because it is so highly resistant to vibratory stresses, the BF-10 Bond assures long service and keeps power flowing year in and year out.

### *2* The BF-10X Bond:

This Cross Bond is a companion of the BF-10 and possesses the same desirable qualities . . . it's easy to install, long-lasting, efficient. A few taps with a hammer secure the self-clamping terminals to the rail where they remain firmly in place while a steel-to-steel weld is applied. No special clamps needed. The heavy cable of the BF-10X will withstand severe and constant vibration.

### *3* The Wedge-Type Bond:

Designed primarily for installation on temporary trackage, the Wedge-Type Bond holds so well that many mines use it for permanent trackage, too. It is easy to install. Just hammer each wedge three times and the bond is on. No welding . . . no lugging of heavy equipment necessary. Yet despite its simple application, the Wedge-Type Bond holds with a grip that won't shake loose. When used on temporary trackage it can be used again and again. Just hammer out the wedge and it is ready for *more* rugged service in a new location. The Wedge-Type Bond has copper terminals and drop forged steel wedges.

(1), (2), (3): All of these are Tigerweld Bonds—all butt-welded. That means that in every case all the wires are electrically connected, permanently, to the solid end pieces. Butt-welding will constantly develop full strength of the strand on a tensile test to destruction.

There are many other U·S·S American Tigerweld Bonds available—welded types, plug types, or splice bar types. Contact your nearest sales office for complete information, or write for our new catalog.

AMERICAN STEEL & WIRE COMPANY
GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA STEEL COMPANY, SAN FRANCISCO
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TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM
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USS

**American Tigerweld Rail Bonds**

UNITED STATES STEEL

# A Gear Ratio for Every Situation with EATON 2-Speed Truck AXLES

Pulling out of a hole, making time on the hills, high-balling on the open highway—each calls for a different gear ratio for maximum efficiency, economy, safety and maneuverability. Eaton 2-Speed Axles double the number of available gear ratios in any truck, allowing the driver to select the one best suited to road, load and traffic conditions. Driver fatigue is reduced, runs are made faster and operating costs are reduced. Eaton 2-Speed Axles are available for most trucks of the 1½-ton class and larger. Ask your truck dealer to explain how Eaton 2-Speed Axles on your trucks will improve performance and save you money.

*Axle Division*

**EATON MANUFACTURING COMPANY**

CLEVELAND, OHIO

**PRODUCTS:** SODIUM COOLED, POPPET, AND FREE VALVES • TAPPETS • HYDRAULIC VALVE LIFTERS • VALVE SEAT INSERTS • ROTOR PUMPS • MOTOR TRUCK AXLES • PERMANENT MOLD GRAY IRON CASTINGS • HEATER-DEFROSTER UNITS • SNAP RINGS • SPRINGTITES SPRING WASHERS • COLD DRAWN STEEL • STAMPINGS • LEAF AND COIL SPRINGS • DYNAMATIC DRIVES, BRAKES, DYNAMOMETERS

# FROM START TO FINISH THE A & G ENGINEERING APPROACH IS DIRECTED TO · · · Cost Savings

This organization has been functioning for thirty-nine years in applying scientific knowledge, impartial judgment, and practical experience to the modernization of coal properties.

The adaptation of machinery in itself is not sufficient to assure efficient operation. The unbiased experienced thinking of A&G engineers assures the correct selection of equipment—the elimination of "bottlenecks"—the reduction of down-time—the proper rate of amortization—the proper ratio of investment to production per man—these mining men also dig out and eliminate certain costly production factors which at present are hidden.

In serving our clientele on a cost and fixed fee basis we are giving them the best possible deal in keeping the total cost in lowest possible figures. Thirty-nine years of doing business has proved this to be fundamentally sound procedure.

Throughout, the A&G engineering approach is a professional one. Eighty per cent of our work has come from previous clients which included assignments from producers of both large and small tonnages.

For detailed information we invite you to write.

## *Scope of Services*

- **Design and construction of new plants and their various units.**
- **Organization, operation, and management of mines.**
- **Below ground modernization and mechanization.**
- **Reconstruction, revamping, or improvement of existing plants.**
- **General consulting work regarding power, equipment, operation, and various mining problems.**
- **Valuations for financing, fire loss, taxation purpose — reports and appraisals.**

**We work with undivided responsibility to you on a cost and fixed fee basis. We are not hampered by any connections which might prejudice the true professional engineering approach to your problems.**

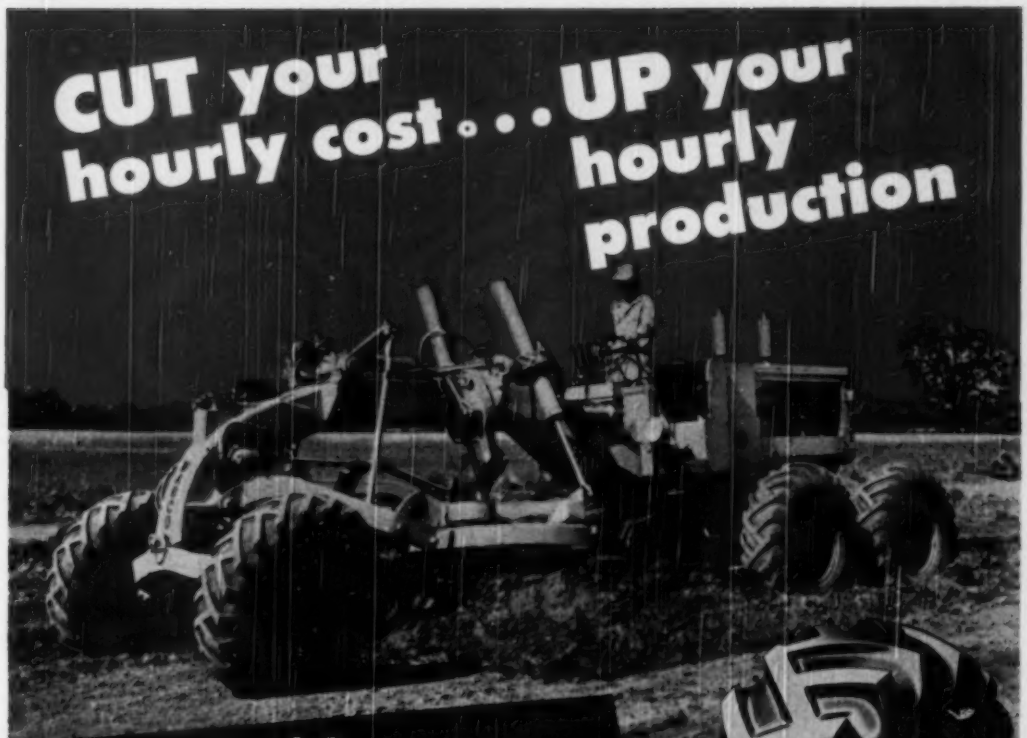
☆

# ALLEN & GARCIA COMPANY

**CONSULTING AND CONSTRUCTING ENGINEERS**

**332 S. MICHIGAN AVE., CHICAGO 4, ILL. • 120 WALL ST., NEW YORK 5, N. Y.**

# CUT your hourly cost . . . UP your hourly production



## with Firestone TIRES

ROLLING equipment represents a profitable investment, but idle equipment means dead loss. When a unit stops, production stops—but costs go right on. We say—and we'll welcome a chance to prove it—that we can shorten your downtime and boost your production with Firestone Tires.

- **WE CAN DO IT** because we carry a complete line to furnish you the right tire for your type of work.
- **WE CAN DO IT** because there's extra material, extra quality, extra skill put into every tire we make.
- **WE CAN DO IT** because our service organization is prepared to see that you get out of Firestone Tires everything we build into them.

Can we do it? . . . Just let us show you! See your Firestone Dealer or Store for complete information.

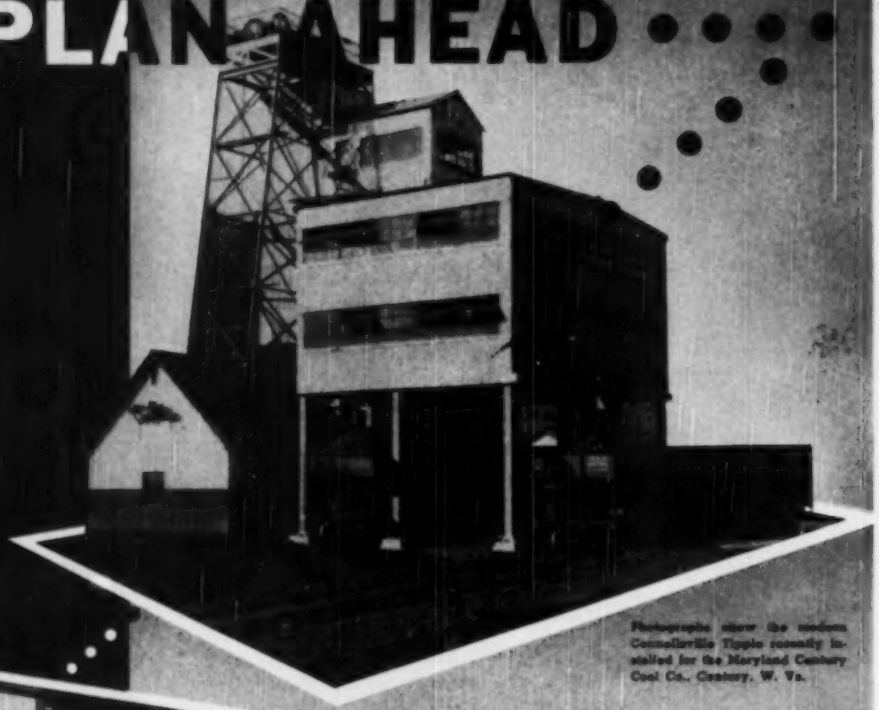
*Listen to the Voice of Firestone every Monday evening over NBC*

Copyright, 1950, The Firestone Tire & Rubber Co.

When you buy new tires or new equipment *always specify* **Firestone**

OFF-THE-HIGHWAY TIRES

# PLAN AHEAD



Photographs show the modern Connellsville Tipple recently installed for the Maryland Century Coal Co., Century, W. Va.

Picking table for meeting present needs.

Provisions for installing coal washer when production demands it.

## TIPPLES Designed and Built for Your FUTURE Needs.

Modern coal markets place the responsibility upon operators for preparing coal efficiently and profitably. Plan ahead—take advantage of a modern preparation plant designed to meet your present and future capacities.

The Connellsville Manufacturing & Mine Supply Co. specializes in the answer to your coal preparation needs. Our modern tipples are designed with allowances for incorporating additional equipment and facilities when future capacities demand it, in addition to giving you the utmost recovery at your present capacity.

Eliminate costly maintenance and repair expense on old tipples—plan ahead now with a modern Connellsville coal preparation plant. Our experienced engineers and manufacturing facilities can aid you in designing and erecting a plant to economically fit your needs. Write for details.

We also manufacture: CONVEYOR SYSTEMS, SHEAVES, COAL AND SLATE LARRIES, ROTARY DUMPS, HOISTS, HAULAGES, SKIPS, CAGES, COKE OVEN EQUIPMENT and Other Allied Equipment.

**CONNELLSVILLE**
**MANUFACTURING & MINE SUPPLY CO.**
**CONNELLSVILLE, PA.**

*"Serving the Mining Industry since 1901"*

# You'll move more ROCK for your money, over the years, with a . . . .

# MARION 4161

Sixty-five years have taught us what it takes to build **REAL** shovels . . . how to build qualities into them that don't meet the eye but are eloquent in terms of performance and dependability.

These extra qualities are **MORE** than worth every penny they cost.

**THE MARION 4161**

*has made an impressive name over the years . . . one company owns 26 of these machines . . . and another has 25!*

**MARION** is proud of the 4161 and its record . . . and stands behind this and every other machine that bears the **MARION** name.

We build good shovels and we back up every **MARION** owner only for one reason . . . it's the best way to give you more for your money . . . both for today and over the years.

**MARION** POWER SHOVEL CO.
MARION, OHIO, U. S. A.

OFFICES AND WAREHOUSES IN ALL PRINCIPAL CITIES

SYMBOL OF

# Low Cost Per Unit of Work

Whenever you see that Bethlehem reel, make a mental note. Remember it as a symbol of good wire rope and rope economy. That's what it means to thousands of users the country over. Sometimes they pay a little more for a Bethlehem rope, but this minor difference in first cost is more than offset by *lower cost per unit of work*—the only true yardstick of wire rope expense.

First cost—purchase price—can be highly deceptive as a measure of economy. The rope with the lowest price tag—offered as a "bargain"—may prove very costly in the long run. But this is a risk you do not take when you purchase Bethlehem wire rope.

Every foot of Bethlehem rope is quality merchandise, made carefully and conscientiously. When, after long service, a Bethlehem rope is finally retired, you will find that it has cost you very little for each unit of work it has done—for each drilling ton-mile, each yard of rock moved and loaded, each ton of coal hauled.

When you see a Bethlehem reel, let it remind you of all these things. Then, when it's time to order—order Bethlehem. You'll like the rope you find on that reel. It will serve you faithfully and well.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

*Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

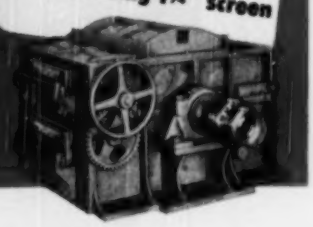
# FOUR MILLION TONS OF COAL CRUSHED

## with a parts replacement cost of only $.0005 per ton

**AMERICAN AC3-E CRUSHER**

**in continuous service for 10 years**

**reduces 300 TPH 6" x 1¼" washed coal to 100% passing 1¼" screen**



## AT THE LITTLE SISTER COAL CORPORATION (St. David, Ill.)

**. . . this crusher is giving a performance that is typically American—*typical* because American Crushers are engineered to "take it," and are *tested in actual use*. They slash power and labor costs too, and cut out-of-service time to a minimum. *Here are a few construction "whys" behind American records*—**

**THE HEAT TREATED ALLOY STEEL MAIN ROTOR SHAFT**—revolves on heavy duty Timken Bearings enclosed in dust and oil-tight pillow blocks. *Perfect balance eliminates vibration.*

**THE HEAVY RIBBED SECTIONAL FRAME**—Cast Steel—permits *accessibility* and *adjustability* . . . bearing pedestals are cast integral with side frames to assure rigidity.

**THE ALL-MANGANESE STEEL CRUSHING PARTS** include renewable Breaker and Grinding Plate, also Crushing Chamber cheek liners. Grinding Plate is adjustable to compensate for long wear.

**REVERSIBLE SHREDDER RINGS**

In reducing coal by *controlled cleavage* (instead of by crushing), these 20-edge manganese steel rings give uniform, high tonnage reduction, with a minimum of degradation, operating at slow (275 to 350 RPM) power-saving speeds.

**Let an American representative analyze your crushing problem. Also, we'll be happy to send you our bulletin, "Crushing Coal at Less Than One Cent Per Ton."**

**American PULVERIZER COMPANY**

*Originators and Manufacturers of Ring Crushers and Pulverizers*

**1119 MACKLIND AVE.**
**ST. LOUIS 10, MO.**

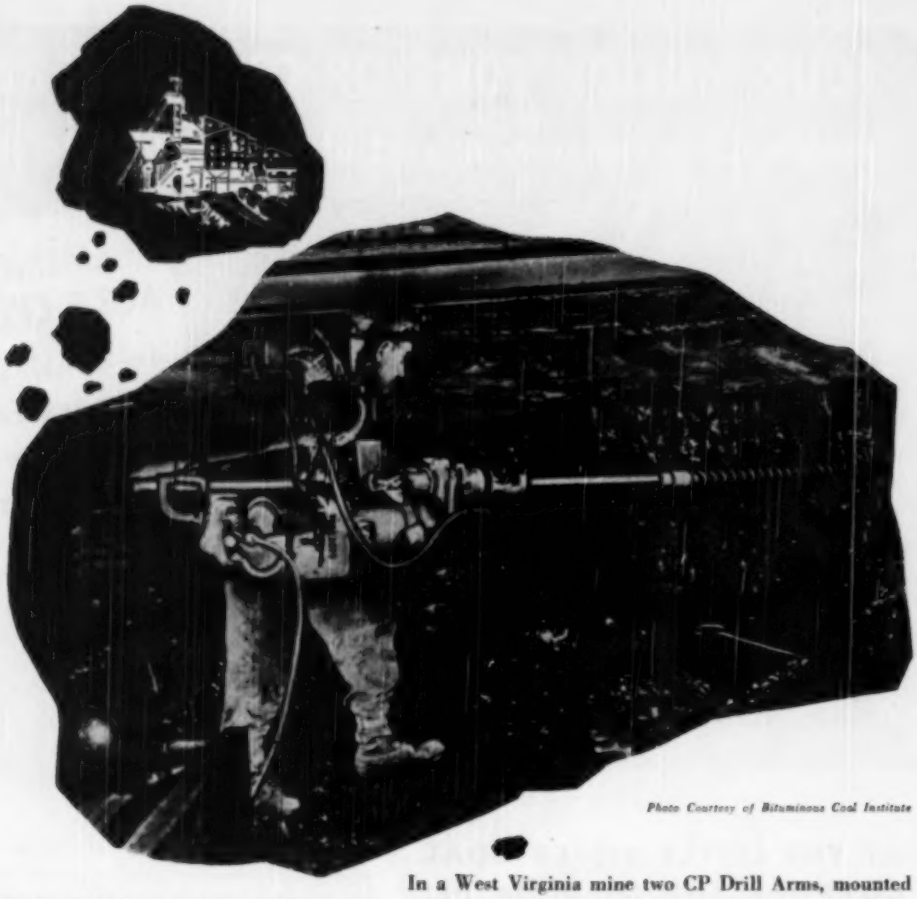


*Photo Courtesy of Bituminous Coal Institute*

## Two CP Drill Arms keep ahead of 3 loaders

In a West Virginia mine two CP Drill Arms, mounted separately, are keeping ahead of three loaders. Each DA-9 Drill Arm has been drilling up to ninety-two holes a shift, and could increase that performance if more working places were available.

So satisfactory has been the operation of these Drill Arms that an additional Arm has been requisitioned, with the probability that still more will be installed.

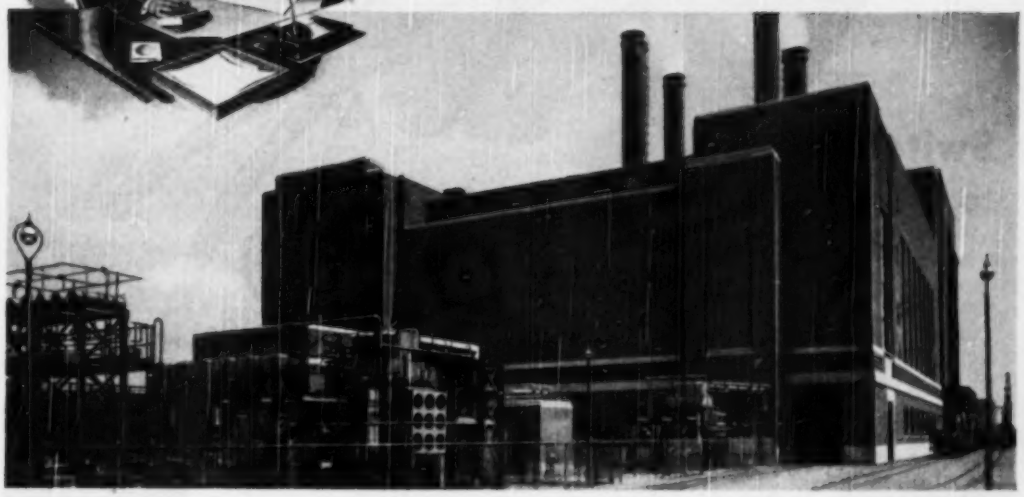
CP Drill Arm units are electrically powered and controlled. To operate, it is merely necessary to move the unit to the face, swing the drill into position and turn on the power. Drill Arms can be mounted on CP Tramdrills, trucks or mine locomotives.

*Write for full information.*

CHICAGO PNEUMATIC TOOL COMPANY

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

# "My bet's on Bituminous-



## —the kind that is mined on the B&O!"

Take a tip from executives who think in terms of fuel economy and dependability of supply. These men design their plants for the efficient coals mined in B&O territory.

These coals, available in wide variety for all needs, lend themselves to mechanized, low-cost mining. As they are located close to America's industrial heart, transportation costs are moderate. And because their sources are *known* and *definite*, they can be depended upon —*even during wartime*—for centuries to come.

Backing its faith in Bituminous, the B&O has made large capital investments in its properties. The result will be even more efficient service for the Bituminous industry and its customers.

*Ask Our Man!*
**BITUMINOUS COALS FOR EVERY PURPOSE**
*from modern mines like this—►*

**BALTIMORE & OHIO RAILROAD**

**Constantly** *doing things* **—better!**

**Switch to this new PLASTIC Reinforced**

# PRIMACORD

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Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry

Coal Age

APRIL, 1950

IVAN A. GIVEN, EDITOR

# A New Start

ONLY TIME WILL REVEAL the full effects of the 1950 wage agreements. But for the first time in many years, bituminous operators can take satisfaction in a real measure of success in negotiations, even though they paid and will pay—along with the miners—a high price. They have a contract that, for a change, means something and therefore provides a long-delayed and much-needed opportunity for progress toward solving some of the pressing problems still confronting the industry.

Above all, the operators displayed a heartening capacity for unity and determination at a time when such qualities were all-important. Equally important, they got valuable experience in handling difficult and complex problems with the odds against them. These are real gains, since the future will test coal-mining management to the utmost. To the obvious handicap of market reaction flowing out of cost increases and interruptions and uncertainty in coal supply must be added the burdens inherent in a loss of ground with the public—a situation aggravated by the pronouncements of public personages up to and including the President of the United States.

There is no blinking the fact that a by-product of the strikes, confusion and uncertainty of the past months is general public acceptance of the idea—purely propaganda that it is—that coal is a sick industry unable to halt the loss of its markets, unable to get along with its employees and unable to provide more than a bare subsistence for its workers. As a specific example, people in large numbers now parrot the contention that the work stoppages in 1949 made no difference because the industry couldn't have offered more employment anyhow. They have distinguished company, since it was reported early in February that Truman and his cabinet were quite willing to go along on the basis of operating only three days a week. And when Lewis publicly writes off the domestic market—presumably serving notice that anthracite, in particular, can expect no help from him—and Truman hangs the epithet "sick industry" on coal in asking seizure legislation and investigation, the public can hardly be blamed for reaching an erroneous conclusion.

So coal has more of a job on its hands than ever—a job complicated by the stresses and strains inherent in adjusting to a new basis of operations. Can coal handle the job? The keys are lower cost, higher quality and better service to the consumer. The tools for attaining these objectives already are in existence or can be developed. They will get results if the industry is given a chance to use them to the utmost. A start has been made toward giving coal that chance. The big need now is for sober down-to-earth planning to broaden that opportunity and a determination to adhere to policies that will insure a sound basis for growth.

Will the results be worth the effort? Conceding all the difficulties ahead, the answer still is "Yes." It is "Yes" because the business goes to the industry that earns it through offering more value and better service. There is no law guaranteeing the fuel market to oil and gas and there is a very real need for a healthy coal industry for national security reasons alone. Even now, the country would be in a bad way if an emergency should throw a heavier burden on oil and cut off imports. Coal can offer more value and better service if it has an opportunity to settle down and really work. With the 1950 contracts appreciably broadening that opportunity, the situation can be truly described as a new start.

Photos: Wide World

**MINERS GO BACK TO WORK with a new contract. Now, the big coal question is . . . .**

# What Chance for Stability?

## The Outlook Is Good If Union and Operators . . .

- ▶ Learn the Lessons of Recent Months
- ▶ Really Try to Make the Contract Work
- ▶ Attack the Industry's Problems Together

THE 1950 wage agreements, and particularly the bituminous agreement, which set the pattern for anthracite, have been characterized by operators and union as an opportunity to stabilize coal. But if full advantage is to be taken of this opportunity, operators, union officials and miners must work together as never before to maintain an uninterrupted supply of coal, attain low cost and high quality, and sell consumers and the public on their industry and their product.

Even if there were no other reason, operators, union officials and miners need to seek closer cooperation because there is not complete agreement that it is possible for them to achieve the desired progress. That is the only conclusion that can be drawn from Truman's statement that coal is a "sick industry" and his request for a Congressional investigation. In addition, other reports indicate widespread administration thinking that coal is ripe for an attempt at some form of government control.

**Stability Problem.** — Attaining stability undoubtedly was rendered more difficult by the course of events prior to final agreement. The necessity for adjusting to a new basis of operations—a direct result of the business losses in recent months—inevitably means stresses and strains making stability more difficult to reach.

Coal, however, can do a lot with the tools now in existence or to be developed if it has an opportunity to settle down and really work. For the first time in years it appears that such an opportunity is opening up. For one thing, a better understanding on the handling of the welfare fund should erase or minimize one menace to stable relations. For another, elimination of the "able and willing" clause and a five-day limit on memorial-period stoppages should remove another source of uncertainty and insure a steadier supply of coal. For a third, the period of the contracts is a major step to stabilization, assuming the dates written into the agreements are observed.

The contracts are good until June 30, 1952—a period of 28 months—and may not be reopened for any change until after March 31, 1951. The dates for both revising and terminating the agreement postdate the heating season and thereby, if there should be a work stoppage, provide a better opportunity of reaching agreement before there is any real strain on the economy or reaction against the industry.

All this adds up to a chance for stability for at least two years and possibly longer if operators, miners and union can attain a better basis for reaching new agreements.

## What Came Out of the Negotiations

SINCE NEGOTIATING agreements has been and will continue a major factor in how the industry fares, improvements in bargaining methods and approach necessarily remain a major industry goal. Analysis of the events of the past is logically a step toward a better

## How Negotiators See the New Bituminous Contract

JOSEPH H. MOODY

"The new contract has as its main contribution to stabilization of the coal industry its date of termination, June 30, 1952. The longer period of time does give the operators and the union a better chance to work out the problems that beset the industry. However, the increased costs that are a part of the contract will tend to disrupt the industry and weaken its ability to meet competition and in this way may add to the problems confronting the industry. The increased tax for welfare and the increase in wages included in the new contract were unjustified by economic conditions. These concessions were forced and included in the new contract because of the power of the union resulting from its complete control of all manpower in the industry.

"The coal industry can reach a state of relative stabilization only by real cooperative effort on the part of the union and the operators. This is extremely difficult because of the consideration the union must give to competition with other giant unions, as well as political and legislative ambitions. These are all part of the problems of industry-wide bargaining.

"It is difficult for me to understand why people outside the coal industry are so willing to write it off. It still provides more than one-half of the energy fuel and heat for the nation. Yes, we are faced with severe competition and all the problems of change that face any industry in a competitive economy such as ours. We believe the managers of this industry can maintain a good portion of our markets. It becomes very difficult when we must also contend with labor monopoly, government intervention and political tinkering, as well as tough competition."

JOHN L. LEWIS

"Negotiation of this contract is a constructive accomplishment by the industry, with reasonable assurance that for a substantial period of time the industry can abate its labor warfare and apply itself—both management and labor—to the constructive problems of producing coal in quantity for the benefit of the American economy at the lowest possible cost permitted by modern techniques.

"The mine workers stand for the investors in the industry and for the return on their capital. They stand for the public to have coal at the lowest possible price consistent with the mineworkers having a decent life with the same opportunities under the law as other citizens."

GEORGE H. LOVE

"This two-and-a-half-year contract gives the industry its first real opportunity for stability in the last decade...

"This coal business is not a sick industry, as has been said recently. This country is one of a very few where coal mining is still in private hands operating under a free enterprise system. It carried the country's enormous needs during the war and since without government help or subsidy. It is a modern aggressive industry with three to six times the productivity of the coal industry in any other country, and we are going to do better than that.

"We need stability and the contract provides it...I hope that from this contract will come such mutual understanding that we will do away with coal strikes in the future."

job in the future. Among the conclusions to be drawn from the recent negotiations are these:

1. Strength pays off at the bargaining table...
2. But strength alone is not enough.
3. Labor laws do not help unless both parties want them to.

**How Strength Pays Off**—By this is meant equal strength on both sides, since inequality means no real contest and no real decision on the merits of the case. For the first time in years, the operators found strength in unity. They paid and will pay—along with the miners—a price, but they learned the value of standing together and got valuable experience in handling complex and difficult questions with the odds against them. Those gains may well be worth the price. Henceforth, knowing that the operators can and probably will stand together, the union may be persuaded to temper its demands and really try to bargain on a basis of realism.

**How Strength Must Be Supplemented**—Power at the bargaining table is not the only quality necessary to get the best results in negotiations. Strategy and tactics are equally vital.

Keeping in mind the rewards of analyzing the past to do better in the future, the task of the operators possibly was complicated by their opening approach. Looking at it in one way, Mr. Lewis was in no position to force any demands in May and June of 1949. The stockpile situation was against him. In the light of what eventually happened, considerable ground might have been gained if a money offer had been made, based on a realistic appraisal of what the miners would have been satisfied with, a shrewd guess as to what Mr. Lewis might accept and a forecast as to what the industry, with ingenuity and careful planning, could afford.

This could have thrown Mr. Lewis off balance. He would have had to choose between accepting a reasonable proposal and turning it down. If he had turned it down, as he probably would have done, the operators, having made a sense-making offer, would have gained stature in the eyes of their customers and the public at large and might have achieved some degree of miner respect.

**Labor Laws No Help**—Neither the Taft-Hartley or the Wagner acts help unless both sides really want to make collective bargaining work. The events of 1949 and

1950 again proved that conclusion. Admittedly, President Truman could have invoked the Taft-Hartley Act earlier, since it is the chosen instrument of the public and the lawmakers for dealing with strikes that get out of hand. But there is no guarantee that it would have worked any better even if Truman had acted earlier.

Mr. Lewis, holding a mine-labor monopoly, could brush aside the give and take of the bargaining table. But because of big stockpiles, he could not bring his power to bear until after the turn of the year. By the same token, stockpiles were a source of power for the operators in the early months. When power on both sides was threatened and equalized—the operators losing their advantage when stocks were used up and Lewis his when seizure loomed on terms unfavorable to him—both sides got down to work.

In the end, the dispute was settled by true collective bargaining, with laws having nothing to do with the final result. At best, laws express the people's and the lawmakers' conception of the mutual obligations of labor and management. As a code of conduct, there is conceivably merit in the Wagner and Taft-Hartley acts. But it takes reasonableness and willingness to make the code work.

## The Job Ahead for Coal

ASIDE FROM the contracts, these additional facts emerged from the dispute of 1949 and '50:

1. Coal lost business...
2. But coal is not a sick industry.

If coal had been available to customers who wanted it in 1949, bituminous production would have been close to 100,000,000 tons higher than it was. Events in 1949 also prove that there are lots of customers, industrial and domestic, who buy and burn coal because they prefer it to any other fuel. But when they can't get coal, they turn elsewhere. That is what some of them did in 1949. This is not to imply that what happened in 1949 and the early months of 1950 can be dismissed as unimportant. Rather, it is a restatement of the fact that coal still has a hard core of preference to build on if it has the will and the means to do so.

**Coal's Basic Role.** — The best proof that coal need not accept the epithet "sick industry" is what happens when coal is shut off. Other industries slow down and finally stop. Cities brown out, railroad activity is curtailed, home owners protest, blast furnaces cool off and state and federal governments get set to act. With such a basic role in the economy, no industry can really be sick for long unless somebody deliberately makes it sick. If coal had been permitted to flow freely and uninterruptedly, there would be none of this recent talk of sickness, production would have been up and competition would have been a lot farther back.

While they cleared away some of the obstacles, the new contracts solved none of coal's basic problems. In the main, they are as follows:

1. Overcapacity.
2. Markets.
3. Labor relations.

None of these problems can be considered apart from the others and none can be solved alone. It will take united, integrated and simultaneous action on all fronts by all parties to reach answers that will be genuinely helpful.

**The Problem of Overcapacity.**— With the exception of the war years, overcapacity has dogged the coal-mining industry for decades. Yet, overcapacity is necessary to meet seasonal demands and guard national security. As the National Bituminous Coal Advisory Council recently put it, "Coal mining and transportation, and the related service and supplier fields, cannot be sidetracked in a time of luxury and recalled for maximum service in time of need."

Now, coal once again is faced with the capacity problem. Pertinent questions are: What is the danger point in overcapacity? How can coal go about keeping capacity below that point?

The problem of overcapacity was examined by *Coal Age* in the February, 1949, issue. The conclusion was that, judging from data since 1920, an excess of capacity over production of approximately 30% or more was a danger signal. Somewhere close to or above that point, the industry, in the past, has slipped over into the loss column. Below that point, coal has stood a fair chance of making a profit.

In an industry made up of a large number of companies each producing only a small percentage of the total output, which is the case in coal, controlling overcapacity is a prickly problem. Cooperative effort in practically any form immediately brings the Department of Justice out in full cry. Amalgamations and mergers are a possible answer but again are subject to the risk of federal attack. So is the regional sales agency, despite the continued existence of at least one. So also is practically any form of voluntary allocation, anthracite practice notwithstanding. And, considering the trend in government thinking, even an industry advisory board limited solely to forecasting demand, whether total or by regions, probably would bring on suit.

**What Government Intervention Means.**—An alternative to industry action is submission to some form of government regulation—perhaps only of minimum prices and perhaps taking in production allocation also. This is an easy way out, but has the grave disadvantage of giving an all-too-eager federal establishment an opening wedge, with complete control almost a certainty in time. A possible exception is a cooperative set-up under special legislation similar to the Capper-Volstead and other acts setting up farm and fishery cooperatives, which are permitted to do their own stabilizing subject only to intervention by federal officials when their actions become contrary to public interest. But the Department of Justice has shown no bashfulness in attacking similar systems when operated by others than farmers. The railroad rate-making system, although approved by the Interstate Commerce Commission, is a case in point.

Although the hard one, about the only way of keeping out of the government's clutches is individual stabilization. This means taking a hard look at the possible market, adjusting output accordingly, getting cost down to rock bottom and then refusing to sell except at a profit. To repeat, it is the hard way, but it would automatically keep overcapacity within reasonable bounds and would have the major advantage of keeping the industry free.

**The Problem of Markets.**—If there was a large and increasing

demand for coal this problem would cease to be a problem. But for cogent reasons, including the events of the past few months, this is not the case.

While Mr. Lewis must accept a share of the blame for coal's present market difficulties, not all of it lies at his door. While many of the coal customers that were forced to turn to oil or gas can be won back, the fact is that there are others—industrial and domestic—who simply don't want coal. They argue, with some justice, that it is bulky, dirty and hard to handle, that equipment for burning it is antiquated and that the price is too high.

One big trouble is that coal got a late start in research, equipment development, marketing and customer service. Another is that there is too little support of these programs. For instance, only 260 bituminous companies, out of a total of over 900 producing 100,000 tons or more per year, subscribe to BCR. The companies, plus 10 railroads and three equipment companies, provided BCR with a slender budget of only $515,800 in 1949—a small fraction over 0.1c per ton of total bituminous production.

Only five companies support the Locomotive Development Committee, the remainder of the industry apparently being content to leave the job to these few companies and 10 railroads. The Mining Development Committee's program is subscribed to by only 67 coal and coal-land companies, plus four railroads. Coal Heating Service advertising to promote retail markets in 1949 cost coal producers only $297,000.

**Horizons in Research.**—The fact is that participation and expenditure on this limited scale is not adequate to finance and promote a research, development and marketing program of the magnitude the industry desperately needs. Putting it another way, if the operators can afford 30c a ton for the welfare fund, they surely can afford 5 or 10c to advance the market interests of their industry. If only 60% of the industry's tonnage had paid 10c a ton in 1949—or only 2% of the average mine price for bituminous—nearly $26,000,000 would have been available to seek new horizons. A similar anthracite payment, on the same basis, would have provided nearly $2,600,000.

In the domestic field alone, though Mr. Lewis publicly wrote it off early in March, there still remains a real opportunity for coal. But with many equipment manufacturers and a fair number of retailers taking the easy way out and concentrating on other fuels, the going is getting tougher. There is good reason, therefore, for the industry to give serious consideration to the formation of its own equipment development, production, sales and service corporation. Then it can be sure that it will get a fair shake. With success, the plan could be expanded to take in industrial and commercial equipment if future events proved it necessary.

**Major Market Weapons.**—Pending these and other developments, however—and even after they come to pass—coal's best weapons in the fuel market will be the tried and tested ones: low cost and high quality. The fact is that coal no longer enjoys the price advantage it once had. Where that advantage has not been wiped out in recent years, it has been narrowed to the danger point. True, some hold that oil and gas must raise their prices, but coal cannot afford to place itself at the mercy of the pricing policies of competitive industries. Therefore, it must intensify its drive for lower cost and higher quality.

With the prospect of over two years of stabilized wages and labor peace ahead, operators now have the best chances in a decade or more to make investments in new mining and preparation equipment pay off. Cost can be cut and quality raised to the point where coal once again will be the favored fuel.

**The Labor-Relations Problem.**—One of the most regrettable effects of the late drawn-out stoppages and three-day work weeks was the forced curtailment or breakdown of many companies' efforts to maintain friendly relations with workers. Though the companies themselves were not responsible for these curtailments, or for thin pay envelopes, it was inevitable that some miners should aim their resentment at the nearest target—the company itself. Certainly, neither the UMWA *Journal* nor union officials urged the miners to be patient or to maintain their loyalty to the company.

It has been long—and rightly—contended that if the miner and the company reach a real understanding based on fair dealing on both sides, the labor-relations problem will be materially simplified, both at home and in regional or national negotiations. In addition, such understanding and cooperation would go far toward solving the problem of public relations. A grassroots job, conducted by each individual company among its own employees and on its home grounds, is looming larger and larger as the main solution to a substantial part if not all of the industry's labor-relations and public-relations problems. The approach to the miners logically should be along these lines:

When fuel users burn gas and oil, the earnings of the miners drop and eventually their jobs disappear. Reasons why fuel users switch are high cost, poor quality and uncertainty as to supply and service. The miner can help please more customers and increase coal's share of the fuel market, thereby increasing working time and earnings, by refraining from unnecessary work stoppages and cooperating with management to reduce cost, boost quality and provide better service.

Since neither the miner nor the union can stand aside and refuse to accept responsibility for the fate of the industry, the approach on the national level is logically the same. One need is better machinery to promote better liaison. For this reason, a full-time "coordinator" or coordinating body to work with the union in getting action in this direction has much in its favor. Eventually, and in fact now—there is no reason why the union should not be sharing with the operators the responsibility for advancing the industry's research and development program, repairing its damaged public relations and nailing down its rightful share of the fuels market.

**Who Must Solve the Problems.**—For its own salvation, and for the long-range good of the nation, coal must solve its own problems. If coal fails to seek and find its own solutions, the road to government control—and possibly nationalization—will be wide open. Admittedly, the problems are difficult. But they are not impossible. The tools are available and have only to be used to the utmost. There is still a hard core of preference to build on, and if the two years of stabilization promised by the new contracts can be broadened and extended, there is truly a real opportunity for a new start.

LOADING MACHINE, shown discharging to shuttle car, averages 425 tons per shift with a 16-man crew, including supervisor. Top is a strong sandstone requiring little timbering, but soft bottom necessitates planking all shuttle-car roadways.

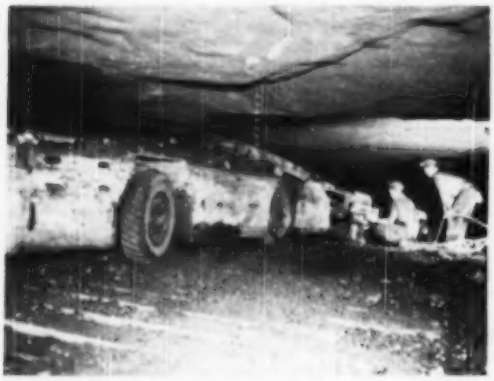
# Adverse Conditions No Bar

## How Complete Planking of Shuttle-Car Roads and Special Facilities for Cutting and Drilling Solved Operating Problems at Tennessee Coal Co. Mine—Result: Loaders Average 425 Tons per Shift

By J. H. EDWARDS, Associate Editor, Coal Age

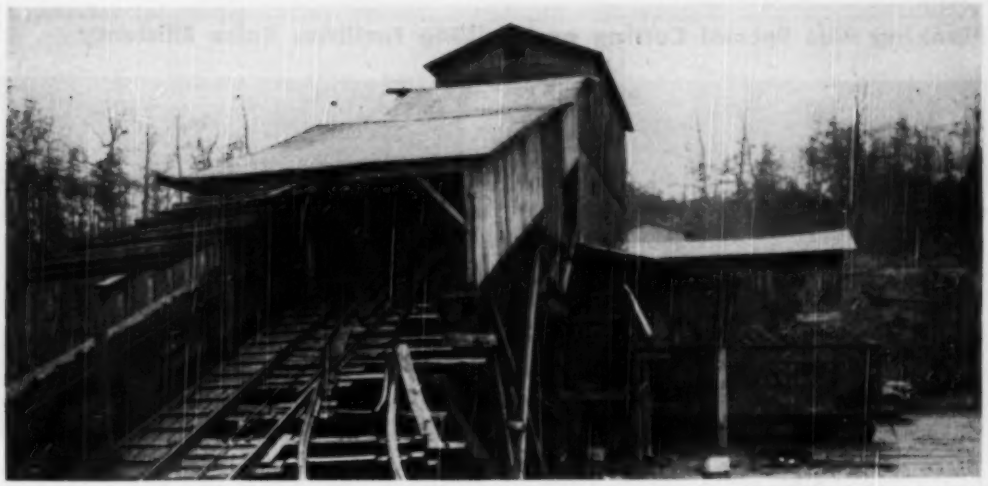
EXTREMELY HARD DRILLING and a bottom so soft that all shuttle-car roadways must be planked have not prevented high operating efficiency at Mine No. 3 of the Tennessee Coal Co., Monterey, Tenn., where two 15-man crews with 14BU'S and shuttle cars are loading an average of 850 tons per shift into mine cars. This performance is a striking example of the results obtainable in changing from hand-loading to mechanical mining, particularly since both men and supervisors were completely inexperienced when the mine was mechanized in September, 1948.

Results have been better than expected, declares W. T. Ray, owner of the mine, adding that he was not oversold by the sales representative who persuaded him to mech-



RECEIVING COAL from the loader, a shuttle car stands on the planked roadway extending to within 50 ft of the face.

PICKING ON THE LUMP BOOM, over which the block and egg sizes, about 20% of the mine output, moves to local truckers.



FOUR-TRACK TIPPLE includes new double-deck shaker screen recently installed. Coal is taken from slope belt at left and former hoisting track now is used only for handling supplies. Coal is sold locally and for railroad and steam use.

# To Mechanical-Mining Success

anize the mine. Peak output during the hand-loading period was 1,300 tons, operating one shift, with a total company payroll of 169 men. The mine now averages 850 tons per 8-hr shift, with a total payroll of 53 men and an average working force of 50, and has produced up to 1,026 tons a shift. The lease includes 1,200 acres of 60- to 84-in coal in a region where, for many years, so little had been mined that the field was not listed in recent data or regulations.

The mine is a slope operation, with the main opening and railroad tipple within 2 mi of Monterey, near the eastern border of Putnam County and midway on the 200-mi stretch of U. S. Route 70N between Nashville and Knoxville. The area is also 100 mi north of Chattanooga. Beginning about 1900, some railroad mines and many wagon mines worked pockets of coal in a horseshoe shape around Monterey. This mining had dwindled to practically nothing by 1937, when thick coal was discovered in drilling a water well. Four core-drill holes and 42 churn-drill holes indicated a 1,200-acre pocket of this seam averaging about 66 in thick.

Work of opening the mine by sinking a 6x16x345-ft slope on approximately 19 deg was begun July 5, 1943, by the Meadow Creek Coal Co. Using a hoist to pull mine cars up the slope, the first coal was run Dec. 1, 1943. Since that time the Tennessee Coal Co. has been organized as the operating company.

• **Seam Prohibits Electric Rotary Drilling**—The seam lies nearly level but has some local rolls resulting in grades up to 5%. The top is a strong reliable sandstone from which the coal parts freely and, as a rule, very little timbering is required. The bottom is 4 to 5 in of rash on a 2-ft stratum of soapstone. The seam is free of continuous partings, but contains lenses of pyrite and pyritic sandstone which make electric rotary drilling impractical. The coal itself is fairly hard, of high-volatile content, and its principal markets are for steam and domestic use. Seam depth at the slope is 100 ft and cover ranges from 50 to 150 ft. To date no gas has been detected in the mine workings.

With hand-loading, the mine operated with the following equipment: 30 Sanford-Day 3½-ton (water-level) drop-bottom mine cars; three cable-reel locomotives, consisting of two Goodman (4½ ton and 7¼ ton) and one General Electric 6-ton; three Jeffrey 35BB undercutters with 6½-ft bars; and two Sullivan 105-cfm compressors with jackhammer coal drills.

Without interfering with production, a 36-in by 525-ft (centers) slope belt conveyor was installed and a 125-ton car-dump bin and feed hopper excavated at the mine bottom.

New equipment for the conversion to mechanical mining was purchased from the Joy Mfg. Co. and includes: two 14BU loaders, four 3½-ton 32E cable-reel shuttle cars, two elevators for transferring from shuttle cars to mine cars and four Type T crawler trucks, two of which carry the cutting machines and the others the coal-drilling compressors and jackhammers.

• **Inexperience With Mechanical Units Quickly Overcome**—None of the men at the mine had had any experience with mechanical-loading equipment and, in fact, had not seen a Joy loader, shuttle car or "T" truck until the units were unloaded at the mine. Two of the mine officials had watched loaders and shuttle cars work for about an hour in a Kentucky mine. The new equipment at Mine No. 3 worked for three days and was doing a creditable job even before a demonstrator appeared on the scene. Mr. Ray considers it remarkable that the men, pretty much on their own, mastered the handling of the machine so quickly.

## Planking Plus Special Cutting and Drilling Facilities Raise Efficiency

AIR COMPRESSOR supplying coal drill remains on the crawler truck on which it is brought into a room as shown here.

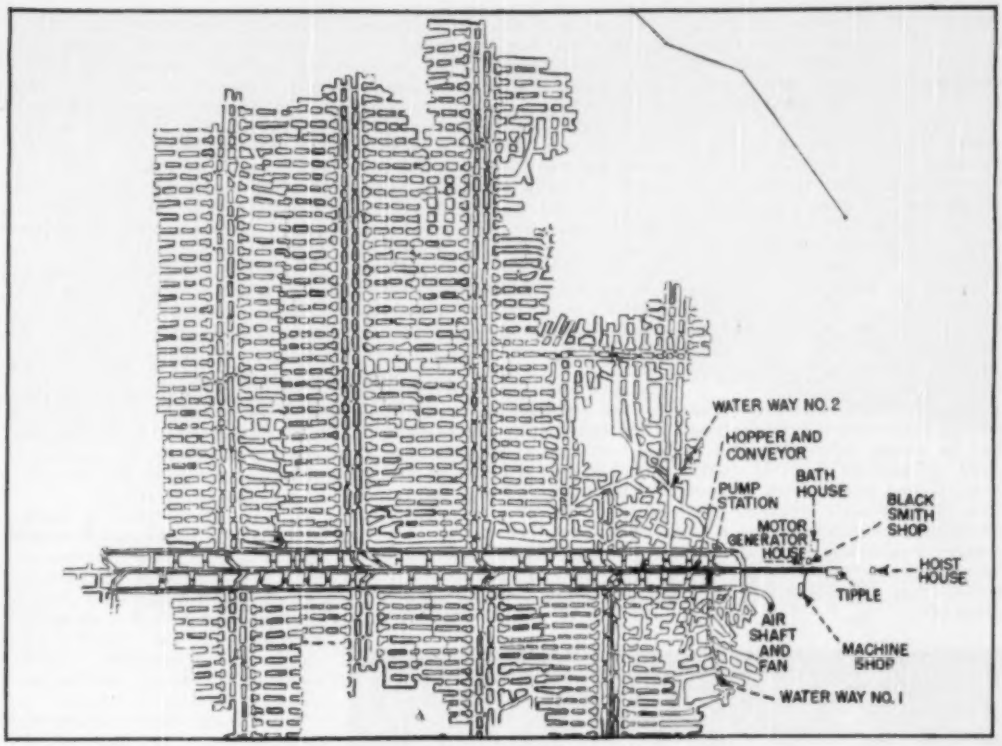
COAL IS DRILLED with jackhammers since tenso. of hard material rule out electric rotary drilling.

TWO MEN per crew completely plank all roadways. Extra material cost is returned several times in greater output.

LOADER CABLES crossing shuttle-car roadways are placed in crack between planks for protection. Top cable serves a shuttle car.

METAL-INSERT BITS speed cutting and reduce bit changes. Crawler truck for shortwall is in the foreground.

INSTALLATION of this 36-in 525-ft-long 19-deg slope conveyor belt was completed without interferring with production.




UNDERGROUND LAYOUT of Mine No. 3, Tennessee Coal Co.

Mine layout was not changed for the new equipment. Rooms 30 ft wide and 200 ft deep on 50-ft centers are driven off both sides of triple-heading panel entries, which in turn are driven from the main entry on 480-ft centers. Rooms are cut together at the inby ends. The longest panel worked to date is 2,050 ft. At present, the main entry extends 3,000 ft from the slope bottom, and the mine projection calls for it to run 2 mi to the far boundary.

When the shuttle cars first were installed it was assumed that perhaps some wet spots would have to be planked. It turned out that numerous spots had to be floored and that there was always a tendency to let the installation of planking go until a car got stuck, thus proving the real necessity. Production suffered, and as a result it was decided to plank all roadways, with the exception of the last 50 ft of each room, which does not get enough traffic to cut through the rash into the fire clay.

• **Planking All Roadways Boosts Output**—The systematic planking eliminated all uncertainty from operations and brought a production increase that pays several times the extra material cost. Formerly, two men were needed to do the emergency planking for a unit. Now, with complete and systematic planking, no additional men are required. The job of the two men includes loading planks into shuttle cars from the storage pile at the elevator. At $40 per M, material for the flooring costs 7.8c per ton of coal mined. The total cost, including wages of the two men, is 15.8c per ton.

Planks for both the crosspieces and the sleepers to which they are nailed are 2¼x6-in by 10 ft, mostly of culled white oak. Three-inch spaces are left between cross planks. The loader trailing cables are laid in these cracks for protection, and the loader is thus able to cross over its own cable. Cutter and compressed-air-drill cables are not placed in the cracks, and when these units cross their cables the crew raises them to permit the machine to pass under.

Four sleeper planks, laid end to end, are used, two at the sides and the other two spaced uniformly between. Secure nailing of the planks to the sleepers is necessary. Two 40d spikes are used at each end, with a single spike in each of the two intermediate planks. None of the flooring is recovered.

Each of the two unit crews consists of 15 men, as follows: two operating the loading machine, two driving the shuttle cars, two operating the cutting machine, two operating the compressed-air coal-drilling equipment, two scrapping bottom, two laying plank roadways, a timber-man, a mechanic and a man at the car-loading elevator. The mine foreman supervises one unit and the assistant foreman the other. Others working underground, bringing the underground total to 42, include: three motormen, two pumpers, a weighman, bottom dumper, hopper man, trackman and attendant for the underground substation.

The total mine payroll, including tipple men, maintenance men and a night watchman, numbers 53. With the ordinary percentage of absenteeism, the working force

averages 50. Workmen are members of the United Mine Workers of America. All cutting is on the loading shift and no work is done at night, when a watchman is the only employee on duty.

• **Coordination Stressed in Crew Training**—In supervision of the unit crew, emphasis is placed on the necessity of each subcrew being at the next room ready to move in immediately after the preceding subcrew has finished. The cutting subcrew is made to realize that its work is the bottleneck, and its is impressed on the other men that their work should, therefore, always be caught up.

• **Faster Cutting Achieved**—The cutting bottleneck is not nearly as bad as it was before Sulmet bits were substituted for the plain type. Faster cutting with sharper bits, plus greatly reduced bit-changing time, materially increased production. Bit cost was reduced by laying off two blacksmiths who forge-sharpened the plain bits.

Weighing of loaded cars underground has been continued with mechanical loading to indicate exactly what each unit produces.

The tipple, on the Tennessee Central Ry., is a wooden structure supplied with shaker screens, a lump boom and facilities for four loading tracks. Block and egg sizes totaling about 20% of the mine output are sold for cash to local truckers and are loaded over the lump boom for one tipple loading track. Recently, the original screen was replaced by a new double-deck shaker furnished by the W. J. Savage Co. Two to four men pick the block and egg but, because of seam characteristics, ash in the shipped coal runs 11 to 13%, thus limiting the sale to local markets. About 20% goes for railroad fuel and 60% is shipped 70 mi to the Watts Bar steam plant of the TVA for use as pulverized fuel.

The 10x12-ft unlined fan shaft, 108 ft deep, is 200 ft from the slope portal. Ventilation is supplied by an old-type fan secured from an abandoned mine and reinstalled at the top of the air shaft. Water encountered in the mine drains to a sump with a two weeks' normal capacity. This sump is between the slope bottom and air shaft. A 500-gpm Ingersoll-Rand centrifugal pump driven by a 25-hp 3,450-rpm Westinghouse ac motor is operated 7 to 8 hr per day. It discharges to the surface through a 108-ft borehole.

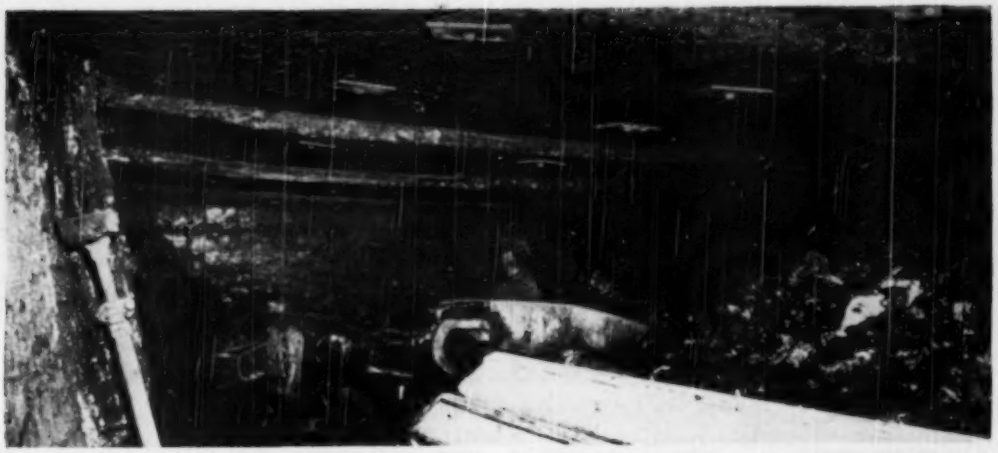
• **Power Costs Kept Low**—Electric power is purchased from TVA at a favorable rate which, for the average monthly consumption of 53,000 kw-hr, nets 1.2c per kw-hr. With a normal mine production of 19,000 tons per month, the energy requirement is the low figure of 3 kw-hr per ton of coal produced. The fact that both dc substations are shut down 16 hr per day saves a large amount of power.

A mine store handling meats, groceries and general merchandise is located near the mine office and tipple and is operated under the name of the W. T. Ray & Co. Emporium. This store is well patronized by the company employees and it extended considerable credit to them during the "unwilling and unable" shutdown.

W. T. Ray, owner of the coal companies, is president of the Meadow Creek Coal Co., and W. E. Morgan is secretary-treasurer. J. A. Allred is president of the Tennessee Coal Co.; J. S. Woodford, vice president; W. B. Brown, secretary-treasurer; James E. Randolph, superintendent and mine foreman; Manual E. Powell, superintendent of maintenance; and Arles Key, tipple foreman. W. G. Irvine is manager of the store, and his assistants are Mrs. Robbie Irvine, Laura McDaniel and Clifton Grant.

GENERAL STORE located near the mine office and tipple is operated by W. G. Irvine (left), manager, Mrs. Robbie Irvine, Laura McDaniel and Clifton Grant.

OPERATING OFFICIALS include W. T. Ray (left), president, Meadow Creek Coal Co., mine owner; James E. Randolph, superintendent and mine foreman, Mine No. 3; J. A. Allred, president, Tennessee Coal Co.; and Manual E. Powell, maintenance superintendent.



ROOF-BOLTING PROMOTES SAFETY and raises efficiency. To fully exploit its advantages, however, new tools and methods are needed.

**How You Can Get . . .**

# More From Roof-Bolting

## Pneumatic Vs Rotary Drilling—Bolt Design, Anchoring Methods and Prevention of Corrosion—Overcoming the Dust Problem—What Is Needed in Tools and Equipment to Fully Exploit Roof-Bolting Advantages

By EDWARD THOMAS, Mining Engineer in Charge
Roof-Control Section, U. S. Bureau of Mines, College Park, Md.

IN APPLYING ROOF-BOLTING to coal mines it was logical that first installations should follow the St. Joseph Lead Co. practice, which had been successful for more than 20 yr. The first Bureau-sponsored installations utilized the slit-rod and wedge bolts. These are not foolproof and probably will be replaced by improved types in the future. Several anchoring devices have become available recently, but while they correct some of the undesirable features of the slit-rod and wedge bolt, other more or less objectionable features frequently are introduced. Nevertheless, approximately 75% of the bolts being installed today are the slit-rod and wedge type.

### Progress in Drilling

It is estimated that 60% of the roof rocks overlying coal beds can be drilled by rotary units equipped with the newer carbide-alloy bits. Rotary drills have not been successful where as little as a 1-in stratum of consolidated sandstone or even occasional occlusions of pyrites must be penetrated.

It should be remembered that before roof-bolting was introduced, compressed air was used in bituminous coal mines only occasionally. Examples of such use were drilling "up holes" to blast for ventilation overcasts, and drilling roof rock in haulage entries in some low-coal mines. Such drilling usually was done with small hand-held hammer-type drills supplied with air from portable compressors. These compressors frequently were low-capacity units designed for intermittent service.

It should be pointed out that best results from roof-bolting have been obtained in highly mechanized mines in which efficient production cycles have been established. In a highly mechanized mine where the production cycle is timed for efficient operation, resistance to the introduction of another piece of mobile equipment which might interfere with transportation and generally disrupt the cycle of operations frequently develops.

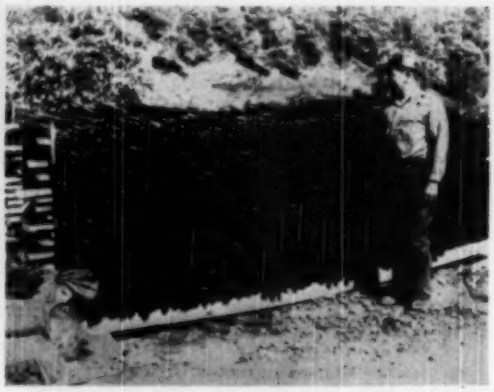
### Mine Experience

More or less typical experiences with roof-bolting in coal mines follow:

**MINE A**—This is a developing mine with 7 ft of working height. Gathering transportation is principally by shuttle cars. Two portable compressors at the mine were used for grading when roof-bolting was introduced. Consequently, one was put to use in installing vertical slit-rod and wedge bolts. Since the compressor was not self-propelled it was placed in a crosscut and the air was piped to the faces up to a maximum distance of 300 ft, after which the compressor was moved forward.

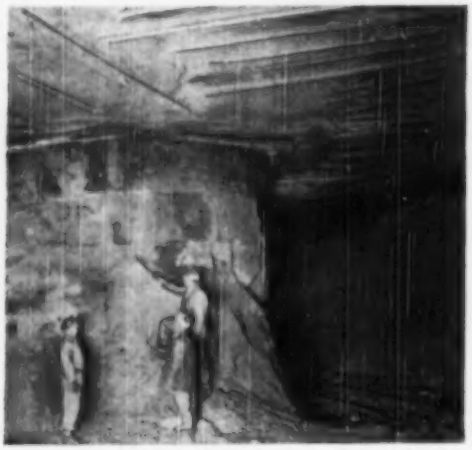
The compressor did not perform satisfactorily when operated constantly at full capacity. Moreover, the stoper, hoses, etc., had to be moved from place to place manually. After the roof-bolting technique was standardized, the mobile equipment could have loaded 50% more coal per shift, but the places available for loading were limited be-

## Roof-Bolting Cuts Supply Handling, Works Well in Low and High Coal



OLD AND NEW STYLES in timber yards—left, 3,000 posts; right, 3,000 bolts.

DRILLING WITH SHORT STOPER (left) and tightening nut with impact wrench (right). Experience shows need for better wrenches.



CHANNELS INCREASE BEARING AREA at intersection (left). The rib also has been bolted to prevent sloughing, as at the right.

cause of delay in moving roof-bolting equipment from place to place.

A self-propelled portable compressor powered to deliver 200 cfm was placed in service for roof-bolting. It transported itself to the face, taking the necessary accessory equipment with it. Time for moving from place to place was reduced sufficiently to enable the bolting crew to keep in step with the face cycle. The output for the section was increased 50% over that obtained when conventional timbering was used.

**MINE B**—At this mine, mobile machines load directly into mine cars. The situation is similar to that at Mine A, and introduction of self-propelled compressors would have interfered with transportation. The time required for moving equipment from place to place was reduced by providing each working face with a stoper and a complete set of drill steel.

**MINE C**—In this mine, which has approximately 6 ft of headroom, coal is loaded directly into mine cars at the face. The roof-bolting program included the use of hand-held electric rotary drills and expansion-type bolts. However, after a three months' trial period, it was found that the drills did not give satisfactory service. Bit cost was excessive because much of the rock consisted of shale high in silica. Also, drilling vertical holes with hand-held equipment was laborious and inefficient. The latest reports from this mine state that rotary drilling has been abandoned. Now, the roof-bolt holes are put in with pneumatic stopers. The management feels that the compressors interfere unduly with transportation. Consequently, bolting is done only at junction points.

**MINE D**—This mine has 42 in of headroom. Gathering transportation is by shuttle car. Preliminary experiments were conducted with slit-rod and wedge bolts anchored in holes drilled with rotary drills. Since compressed air was not available, the bolts were anchored by hand, using sledge hammers. This method was not satisfactory. Therefore, several post-mounted electric percussion drills were obtained and used for both drilling and anchoring. These drills were not satisfactory under constant use. At present, in one section of the mine in which the roof strata contain several laminations of sandstone, pneumatic percussion drills with slit-rod and wedge anchoring are used, whereas rotary drills and expansion bolts are used in two other sections.

### Tightening and Anchoring Bolts

Although the slit-rod and wedge type of anchor bolt does not afford an entirely satisfactory installation, it is widely used nevertheless, and this use is likely to continue for some time. It has the following disadvantages:

1. Very close tolerances must be observed as to depth of hole, necessitating close supervision. If the hole is too long, the bolt will not seat properly and therefore is worthless for roof support. If the hole is too short, too much of the bolt will protrude.

2. Considerable experimentation sometimes is required to determine the correct size of wedge with respect to the diameter of the hole.

3. Bolt diameters of less than 1 in are not recommended because the quantity of metal removed in making a slot (⅛ in wide) is constant and, with bolts less than 1 in in diameter, the base of the slot is a point of weakness.

4. At best, the actual bearing surface is small, and in rock where plastic flow is a factor the bolt will not maintain its tension.

5. The most efficient and effective method of anchoring this type of bolt discovered to the present time is to apply a percussion-type drill to the end of the rod after first protecting the threads with a dolly. Inasmuch as all effective tools for this purpose are pneumatic, use of this type of bolt is ruled out when electric rotary drills are used. In fact, the main selling point for most competitive roof bolts is that a compressed-air tool is not required for their installation.

Advantages of the slit-rod and wedge type of bolt, if installed properly, are:

1. It cuts a dovetail while being driven home and, in tension, the bolt will fail before it can be pulled out of a hole. In a series of hydraulic-jack pull tests made by a large user of these bolts, the average failure in tension occurred at 13.5 tons. These tests were made on bolts selected at random and which had been installed at least six months.

2. It is not patentable and may be purchased on a free market.

### The Goal in Bolting

Virtually everyone agrees that the primary effect of roof-bolting is to consolidate several strata into a thick beam, holding the several parts rigidly together as a single unit and preventing flexure at points where the elastic limit might be exceeded. This may be done by one of two methods:

1. Anchoring the bolt at the upper and lower limits and, through tension on the bolt, preventing side thrust of the strata.

2. Using a wooden pin in contact with the strata throughout its length, as employed by Sterling Lanier, Norton Coal Corp., Nortonville, Ky., thus eliminating the necessity for an anchoring device or bearing plate.

In the first method it is obvious that as much as possible of the tensile strength of the steel should be utilized when the bolt is installed. Preliminary tests of 1-in bolt installations on 4-ft centers (16-ft roadways) indicate that when the bolts are loaded to 50% of their rated yield-point strength after installation, no additional subsequent loading need be expected. This provides a good factor of safety if a bolt corrodes. If future tests prove this conclusively, we probably will recommend this method as standard practice.

For efficiency in installation, as well as uniformity in loading the bolts, we recommend that the nuts be tightened with a power impact wrench even though wrenches commercially available are not entirely satisfactory. No available electric impact wrench is capable of tightening a 1-in nut to approximately 250 ft-lb of torque.

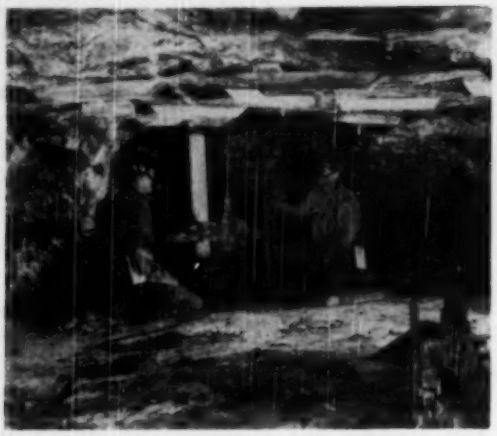
Available pneumatic impact wrenches were not designed with roof-bolting in mind. Two new identical wrenches often will vary as much as 20% in the amount of torque applied to a nut. The mechanisms of these wrenches are not dust-tight. Consequently, their performance is not too satisfactory under coal-mining conditions. The manufacturers of pneumatic-impact wrenches generally have failed to provide mine repair-shop mechanics with instructions as to procedure in repairing and adjusting these devices.

### The Dust Hazard

In the first experimental installations of roof bolts in coal mines the possibility of failure was of such

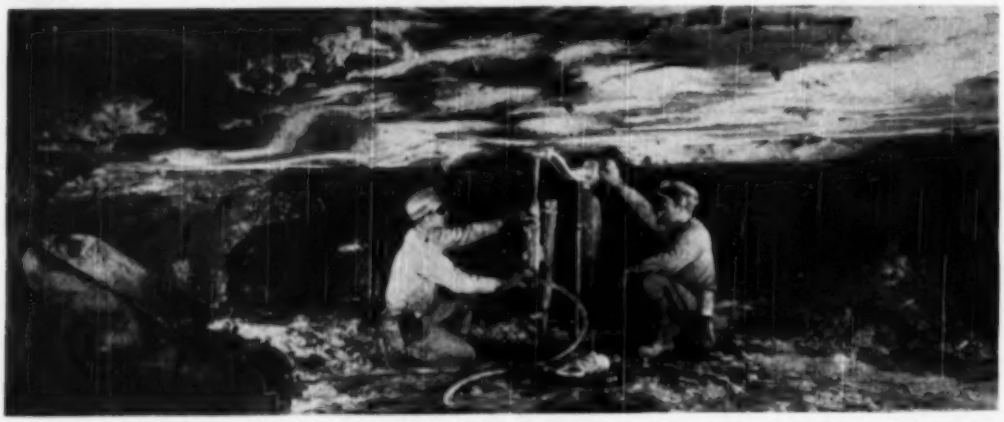
## Varied Equipment Utilized to Meet Roof-Bolting Problems

EXTRA TIMBERING is not required in taking bottom to improve grade where the roof has been bolted. Channels have been used here.



HAND-HELD ROTARY DRILL adapted to bolting, using column and ratchet. Metal-bearing plates are supplemented by treated-wood plates.

RUBBER-TIRED ROOF-BOLTING MACHINE drills holes with rotary auger for expansion-type bolts. Anchoring the bolts and bearing plates in the roof is done by means of an adapter placed on the end of the auger (right).



METHODS AND EQUIPMENT for neutralizing the dust hazard in drilling bolt holes include this newly-developed dust trap.

concern to the mine officials that it was very difficult to encourage them to request additional appropriations for water-pipe lines or tank cars from their respective companies. Frankly, we considered it more important to obtain experimental installations to prove the practicability of the method, leaving dust control a secondary consideration, rather than insisting upon adequate dust control and possibly impairing the interest in making experimental installations.

Early in 1949, however, when roof-bolting became popular and our field men gained enough experience so that they could forecast the approximate results after examining proposed places of installation, it was difficult to convince these new users that dust-control measures should be adopted at their particular mines, especially when some of those who had made the original experimental installations had not considered such provisions.

The standard effective method of dust control with pneumatic percussion drilling has been, for many years, to force water under pressure through hollow drill steel to the bit. Over the years the method has been enforced so rigidly—particularly in rock drilling in metal mines—that it has been taken as a matter of course, even though drilling vertical or near vertical holes is a sloppy, disagreeable task.

The coal miner, however, is an individualist and, regardless of any explanation that such wet drilling is standard practice in metal mines, he is unimpressed and wants no part of such a disagreeable task. It is difficult for him to visualize the silicosis hazard or take it very seriously. Therefore, he may be inclined to gamble with his future health for the sake of his immediate comfort. He does not offer serious objections to using a respirator when his boss is nearby, but is inclined to discard it when not under direct supervision. However, if he wore a respirator continuously, others working "down-wind" from him may have no similar protection. Moreover, in many mines, especially those in which shuttle cars are operated on "fireclay" floors, the large quantity of water required to allay the dust from drilling effectively softens the fireclay, and the churning action of the rubber-tired shuttle-car wheels produces mud holes in the mine floor.

Experimental installations were made in a few bituminous coal mines using pneumatic percussion drills operated wet. No labor trouble or operating difficulties arose. At one large mine, however, an experimental installation was started with dry drilling. Later, after the wet method proved to be effective, both labor and operating difficulties occurred, and several months elapsed before the rate of drilling wet equaled that when drilling dry.

Attempts have been made to use high-speed rotary coal drills designed for horizontal drilling in vertical drilling for roof-bolting. Water, however, could not be applied at the bit to control the dust. The design of such a drill makes it virtually impossible to keep the stream of water falling from the hole from entering the drill-motor casing.

Some company representatives and others are studying two possibilities:

1. Developing a dust collector to collect dry dust as it is produced at the collar of the drill hole as effectively as dust can be controlled with wet-percussion drilling.

2. Using a foaming agent to reduce the quantity of water ordinarily required in wet drilling to collect the drill cuttings at the bit.

### Tools and Equipment

Bolting promises to be one of the most important contributions to the control of roof in coal mines in modern times, not only to reduce the number of accidents and injuries from falls of roof but also to improve operating efficiency at the working faces. Obviously, this method of roof support is not applicable to any and all conditions under which coal is mined. However, after experimental installations have proved the practicability of roof bolting, specific equipment is necessary to exploit the possibilities of the method to the fullest extent. In the light of this, the following suggestions are in order.

1. Before a manufacturer sells a portable compressor for use in a roof-bolting project, he should be certain that the unit will deliver the rated capacity under continuous operation.

2. A device is needed that will anchor the slit-rod and wedge bolt without using a percussion drill. It is stated that patents have been applied for two such devices. One includes an explosive cartridge that is placed on the end of the wedge and detonates when the wedge strikes the back of the hole. The other seats the belt through a hydraulic jack. Neither of these devices has as yet been tested by the Bureau or offered commercially.

3. An electric percussion drill and an electric rotary drill should be developed that will give satisfactory service under conditions of wet drilling and continuous use.

4. There is a definite need for self-propelling drill mounts that, in addition to the drill, will transport the bits and all the other accessories needed for roof-bolting operations.

5. The ideal roof bolt should have the following characteristics: (a) rapid installation with either an electric or a pneumatic tool; (b) maximum bearing area at the anchoring position (in fact, it appears from the work done with wooden pins that the most effective bolt is one that would cling to the walls the entire length of hole, thus eliminating the necessity for a bearing plate); (c) bolts intended for permanent or semi-permanent openings should be constructed of corrosion-resistant metal or the entire bolt installation should be sealed. This latter need is becoming more and more evident even though roof-bolts have been used only a short time in coal mines.

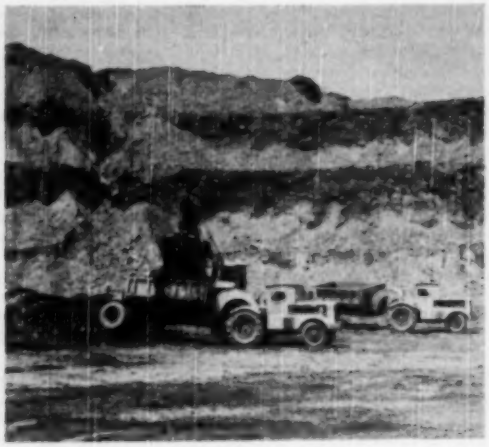
6. A more dependable and stronger pneumatic impact wrench than is available at present should be designed and offered for sale.

7. An electric impact wrench satisfactory for underground use should be designed and marketed.

8. A practical efficient dry dust collector should be developed.

9. A device, perhaps similar to a "jumbo," should be developed that will permit drilling holes and installing bolts ahead of the operator of a continuous mining machine to widen the field of use of such machines.

The facilities and services of the Bureau of Mines are available to manufacturers for such advice and counsel as will assist them in developing the proper tools and equipment to facilitate roof bolt installations. Since the method had been in common use for over 20 yr, and neither the method nor the basic design of the bolts could be patented, the Bureau has not spent public funds to promote products that could be produced by only one manufacturer. Also, being a public agency, the Bureau of Mines cannot engage in sales promotion of any kind. However, it welcomes suggestions to improve the technique of roof-bolting to the end of benefiting the coal-mining industry.



PRESENT AND FUTURE PROBLEM: low-cost anthracite production. Major reserves are in the pitching veins, where mining (left) is troublesome and costly. Stripping and bank recovery (right) are present methods of achieving lower cost but are relatively limited in life.

**Anthracite Problem and Opportunity . . .**

# Mechanical Pitch Mining

## New and Promising in Its Approach, This Discussion of a Pitch-Mining Suggestion That Might Slash Anthracite Costs in Half Is Presented by Coal Age to Promote Further Study—The Editors Invite Comment and Suggestions

HARD ECONOMIC FACTS dictate early and intensive study of ways and means of mechanizing pitch mining of anthracite. Exhaustion of reserves in the areas where anthracite beds lie relatively flat is much further advanced, leaving pitching beds as the major source of production, since bank coal is petering out and stripping has a relatively limited future.

For these reasons the Schuylkill region, lying southwest of the other two anthracite regions, is looming larger and larger in importance, and in this region pitching coal is the rule. The Schuylkill coal measures constitute 57.5% of the entire area underlain by anthracite and are estimated to hold 83.2% of the remaining anthracite reserves. This results from the original coal content of the region—2½ times that of all the other regions combined—and the fact that as of Jan. 1, 1945, exhaustion in the Wyoming region had reached 58.2% and in the Lehigh region, 85.6%, compared to 18.0% in the Schuylkill region.

In recent years the production percentage of the Schuylkill region has been increasing—from 32.8% in 1924 to 42.2% in 1947. The ability of the Schuylkill region to increase production to meet market demands is shown by the fact that production in the war year 1944 was 56.8% greater than in 1939, while the increase in the Wyoming region was only 1.2%.

• **Problems in the Future Production Picture**—While all these facts indicate that anthracite must look to the Schuylkill region for the future, there are certain factors that becloud the immediate outlook. The 1944 increase in production actually was a result of an increase in bank production (169.5%) and in strip output (191.9%). Production from deep mines actually dropped 3.9%.

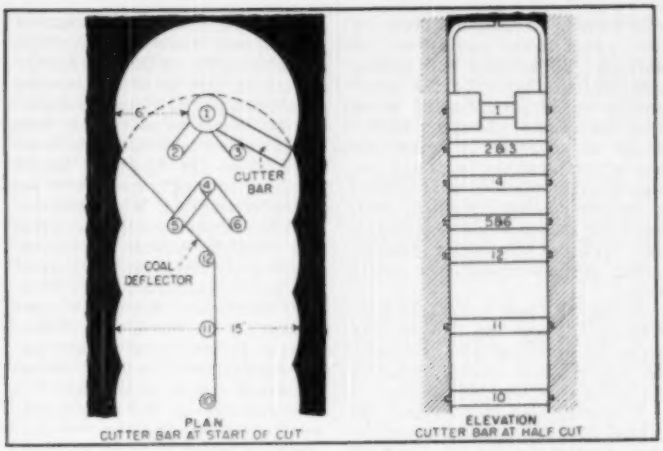
Coarse culm bank producing barley and larger are estimated to be 80% exhausted, and the coal content of the remaining 20% is appreciably less. The fact that exhaustion already is being felt is indicated by the 12.1% drop in bank production in 1948.

The large tonnage of fine sizes in silt banks, and to be recovered from desilting basins along the Schuylkill River, are not at present considered sources of production for the main anthracite market.

Similarly, stripping cannot continue indefinitely at its present high rate. Outcrops have been largely exploited. Basin stripping with large equipment can maintain high production for possibly 12 to 15 yr. Soon thereafter, however, these bonanza strippings will have been exhausted.

Another adverse factor is the "unfair" mining practices employed at several hundred operations. In 1948 the output of anthracite at non-union mines was 2,067,735 tons, or 21.4% of the union production from deep mines. Another 1,839,227 net tons of commercial production came from mines where no attention was paid to workmen's compensation, social security requirements, withholding tax, and so on, meaning that labor cost per net ton

Abstract of a paper now being discussed by anthracite engineers.




REAL ANSWER: new machinery and methods for pitch mining with low cost and safety as the major goals. How a suggested machine might be used is shown here.

for them is nearly one-third less.

• **Miner Attitude**—Even more important in considering future prospects for economical production are miner attitude and the body of precedent built up over the years which have had the effect of discouraging new methods and perpetuating hand mining.

Facts show that urging the anthracite miner to increase production is fruitless. At the end of the four war years, the labor cost of producing a marketable ton of anthracite underground had risen 169%, of which 69% was a result of increases in rates and prerequisites and 31% of men refusing to produce at an equal rate. In fact, production per total employee is today no more than 30 yr ago, whereas it should have increased enormously for these four reasons:

1. The major increase in commercial yield from run-of-breaker input arising from sale of large tonnages of small sizes previously discarded as unmarketable.

2. Heavy production from low-labor strippings.

3. Large production from low-labor banks.

4. A major reduction in breaker manpower through use of mechanical-cleaning facilities.

• **Roof-Control and Water**—Aside from the reluctance of the miner to work as hard or as long, and his objection to the severe physical strains involved in supplying and carrying on face work, pitch mining is being materially affected by a complete absence of roof control. It is true that many breasts have and are being successfully driven without apparent roof movement and with few fatalities. But it is equally true that before pillar-robbing is started, caves and squeezes frequently occur, clean-up and maintenance become heavy, roof collapse prevents complete pillar extraction and fatalities from falls are increased.

Roof control is vital in attaining the three major mining objectives: safety, full recovery and economical extraction. Present practices militate against attaining these objectives in three ways:

1. Shooting off the solid.

2. Long exposure of the roof to the action of gravity, moisture and temperature changes.

3. Stresses and strains induced by mining in nearby underlying and overlying beds.

Timbering in the conventional manner is not the answer because the function of timber is to provide temporary protection against the stratum immediately over the bed.

Another disadvantage of present pitch-mining practice is a direct result of the lack of roof control and may be termed "the water problem." Caving the strata to the surface means handling most of the rainfall and stream flow by pumping or drainage tunnels. At the 1948 rate of 32.4 tons of water per ton of underground production, water handling represent a major cost.

Present pitch-mining practice involves large quantities of high-priced timber, none of which is ever recovered for re-use. In addition, the labor cost of handling and installing it far exceeds the original material cost.

• **The Burden of Precedent**—A final and important disadvantage of present pitch methods stems from the hoary practices of the past which today surround all the minutiae of breast mining. A foreman striving for efficiency in face work is completely stymied by rules and regulations from the past, perpetuated by every new wage agreement. Many believe that this forced adherence to the past is a more potent factor than the present liberal wage scale in causing the present high per-ton labor cost.

On all sides, evidence is mounting to show that anthracite is encountering growing difficulties in maintaining its position in the space-heating market. Both convenience and price are involved. All the evidence indicates that the time is approaching when the anthracite industry must find some method of achieving economical production of commercial coal from deep-mine operations in the Schuylkill region. To be truly "economical," such production should contemplate a market price much lower than that prevailing today.

All in all, the need is for a revision in present pitch-mining practices—a revision based on machine rather than hand mining.

• **What Mechanical Pitch Mining Involves**—Total mechanical pitch mining presupposes the application of power through machinery for all steps in mining and handling coal in breasts. If only one or two phases were mechanized, most of the rules and regulations previously referred to would still apply, and the only advantage gained would be an easing of the work of the miner, with no gain to the industry through increasing unit production or decreasing labor cost.

If, however, a radical change could bring about total mechanization, almost all the slow-down resulting from these old uses and customs would be eliminated because they would not apply, and the well-thumbed book of old rules could be thrown away.

As a preface to a discussion of a possible mechanical-mining method, the following are "musts":

1. Safety of the face worker must be the first consideration.

2. The face worker must not be required or permitted to lift or

carry anything—not even himself.

3. The roof must always be kept intact to reduce the hazard from falls.

4. Adequate ventilation must be provided and maintained.

5. No explosives in breasts.

6. No timber and no supplies, except for power.

7. Yield of domestic sizes must be increased.

8. All the coal in the bed must be mined.

9. The colliery water hazard must be removed and the pumping load materially reduced.

10. Output per producer must be increased many times.

In one sentence, the 10 "musts" may be expressed as follows:

A face machine capable of performing all the mining operations continuously without the use of explosives must be housed in a framework capable of climbing safely straight up the pitch, and the width of the face and the speed with which the breast is driven must be so fixed that immediate backfilling will prevent the roof from ever breaking.

● **How a Mechanical Pitch Miner Might Be Designed**—The business end of such a machine might consist of under- and overcutting bars, each with a backcutting section, so that as they were swung from one rib to the other the coal would be cut completely loose at the top, bottom and in the back.

To break up the coal as it was cut free, a hewer would be positioned between the two bars. In effect, this hewer would be a special jackhammer. Both hewer and bars would operate from and pivot around a column, which also would function as an anchor proper. Necessarily, it would have to be in the form of a hydraulic jack, built into which would be drills for making anchor holes, the steels themselves acting as anchors.

A frame or base would then have to be designed to (a) hold the column in absolute safety in position for the cutting and hewing elements to mine a section, say, 6 ft deep across the entire face and semicircular in shape, and (b) permit the column to be advanced up the pitch in, say, 6-ft steps in absolute safety.

To accomplish this, the frame might be divided into two sections, each with three jacks, hydraulic in nature, with the three upper ones equipped with drills for making anchor holes in the roof and floor, the drill steels again serving as the anchors. To advance the mining elements, the jacks for the upper section would be collapsed, along with the column; the upper section would be advanced by a suitable power unit; and the jacks and column would be adjusted and anchored in the new operating position. Next, the lower section would be pulled up and anchored in similar fashion, using the aforementioned power unit.

In moving the unit from one location to another, the two sections would be uncoupled into two parts of, say, 5½ ft in length, for transportation on a low-slung truck.

It is suggested that specially designed hydraulic jacks be used for roof support behind the machine, using holes already drilled for the machine jacks, as shown in the accompanying illustration. If more protection were required, roof bolts might be installed between jacks and ribs.

A steel shield naturally would be provided to protect the men operating the machine.

● **Operating the Mechanical Miner**—In operation, the machine would be installed between the gangway and monkey heading, pointed straight up the pitch and started. As the machine advanced, half the breast width of 15 ft would be reserved as a runway for the coal and the other half for travel and supply handling. The coal runway would be constructed by hanging suitable sections of sheet steel to the post jacks, with a deflector at the rear of the machine to conduct the coal over to the runway.

For men and supplies, a sled-mounted "skidder" operated by a hoist and endless rope, with the hoist at the gangway and a sheave on the rear of the machine, could be provided. The skidder would travel on the bottom, with a wire rope as a guide to keep it in line.

Ventilation would be provided by blower fan and specially designed tubing.

When the machine had worked up to the upper gangway, it would be uncoupled and loaded onto trucks for movement to the new location.

Three men would operate a mechanized breast—two on the face machine and one on the gangway. The rate of advance should be one 6-ft cut per hour, seven cuts per shift. However, a longer bar might be suitable. In an 8-ft bed of coal these three men should produce 60 cars of coal, 125 cu ft per car, per shift. With six such mechanical breasts, each working three shifts and allowing 8% of the total monthly working time for moving, a mine should produce 1,000 cars per day.

A bed thickness of 8 ft has been mentioned because that is believed to be about the maximum height which can be readily mined with the suggested machine. Where beds are 16 to 20 ft thick, however, an initial pass would be made in the bottom, selecting the strongest bench available as the temporary roof. Then, when the machine reached the upper gangway, it would be turned around, jacked up on a subframe and started down the pitch, mining the upper section of the bed. The same coal runway and skidder path would be used, and the real roof would be bolted in place.

Where two benches were encountered separated by rock of, say 2 ft or more in thickness, the procedure might be as follows: mine the bottom bench; backfill; mine the upper bench.

● **Roof Control and Pillar Extraction**—To get adequate roof control it is recommended that a finished breast be backfilled immediately. One of the best ways is to backfill hydraulically, using the "sawcut-box" method developed and successfully used at the Kohinoor mine under Shenandoah. Two men would be required for backfilling: one operating a hoist on the upper gangway, and the other down in the breast extending the sawcut boxes as filling proceeded and recovering the post jacks, sheet-steel coal guides and the flushing pipe.

It is recommended that the breasts be driven on 30-ft centers in this mechanical mining. With breasts 15 ft wide, pillar width also would be 15 ft. When all breasts on a gangway had been driven and backfilled, first mining could be considered completed, with a recovery of 50% above the monkey, or slightly in excess of the total now obtained from both first mining and robbing.

The next step would be mining the pillars between the backfilled breasts. Evidence indicates that the filling becomes sufficiently strong to stand up and act as a substitute rib, though as yet there is little data on how long a time is required. But backfilling can be depended upon to maintain the roof firm and intact. Then, if pillar recovery was started at the inby end of the gangway and backfilling was done immediately after each pillar was removed, it is believed that complete extraction

above the monkey could be achieved without roof trouble or collapse.

Backfilling offers some possible problems in erosion by flowing coal and possible crumbling, unless the material is permitted to set firmly, but evidence indicated that these and other problems are not too difficult to solve.

The layout for mechanical mining requires the use of the upper gangway as a passageway, both for returning the face machine after the completion of each breast and pillar and for facilitating backfilling. Therefore, the upper gangway and its heading stumps must be preserved intact until these stumps can be robbed concurrently with mechanical removal of the pillars above the lower gangway.

Some possible conflicts with certain provisions of the anthracite mine law might be cited as bars to this proposed method of mining. Actually, some only appear to be bars while others undoubtedly could be removed upon showing of a definite safety gain. What to do if the power fails is another possible objection. Actually, power seldom fails, and it would be simple to equip the machine with a man-rope which the operators could use to lower themselves to the gangway under their own power.

• **Development Procedure**—Eventually the method proposed in this study probably would be modified and perhaps other different methods and equipment might be developed. But in view of the benefits to be gained, it is believed that the following should be done:

1. A financing plan should be agreed upon by interested operators.

2. An operator advisory committee should be established to coordinate and advise on research and development.

3. A competent engineer should be employed to prepare plans for both a mechanization layout and the necessary equipment, and to see to the building of the first unit.

4. The engineer should put the machine in operation after carefully laying the ground by selling company and operating executives, getting the best operating man at the colliery selected for the test appointed as foreman, and assisting that foreman in picking the best and most loyal workmen for the trial.

5. The engineer would report on operation of the first machine, with recommendations for any changes that experience had indicated were necessary.

There would be a cost—and not necessarily a small one. However, among the possibilities of keeping it down is government aid in building the first unit.

• **Savings in Labor Cost**—As to the possible benefits in terms of reduction in labor cost, forecasts necessarily cannot be exact. But, using present methods and being almost directly comparable by reason of the fact that the major output comes from above the monkeys, one efficient operation, where the net earnings per producer in the first nine months of 1949 averaged $16.20, achieved a contract labor cost of $2.432 per net ton. The cost of explosives, paid by the miner, was 16.0c per ton; timber cost was 20c; and refuse loaded with the coal was 30% by mine-car volume.

If the proposed machine could average a cut an hour and the crew of five, including men doing backfilling and recovering material, was paid a total of $81 per shift, an average of $16.20 each, labor cost per ton would be as follows:

| Coal Thickness | Production Per Place Per Day | Production Per Man Per Day | Contract Labor Cost Per Ton |
|---|---|---|---|
| 9 ft. .. | 213.3 | 42.3 | $0.38 |
| 8 ft. .. | 190.5 | 38.1 | 0.42 |
| 7 ft. .. | 175.5 | 35.1 | 0.46 |
| 6 ft. .. | 142.9 | 28.6 | 0.57 |
| 5 ft. .. | 119.1 | 23.8 | 0.68 |
| Av. ... | 168.3 | 33.6 | 0.50 |

This compares with $2.43 for the efficient colliery previously cited and $3.73 for the region as a whole. The saving would be reduced, however, by machine moving cost, estimated at $81 per day; power, $10 per day; and pumping (3 tons of backfilling water per ton of coal at an assumed head of 600 ft), $7.08 per day. On a per-ton basis, these three items would total 58.3c, making the net saving approximately $1.50 per ton.

• **Additional Savings Through Mechanical Pitch Mining**—In addition to net savings in contract labor, there would be important additional savings, as follows:

*Cost of Charge-Offs*—Doubling recovery per acre would cut in half required property-cost charge-off ARTicle S-141 (469 .... fiwfi eta per ton and would lessen the charge-off for plant and equipment, depending upon life.

*Cost of Development*—Here, again, a method that can double the recovery per item of primary or secondary development will ultimately halve the per-ton cost of that development.

*Cost of Materials*—The timber purchase cost of 20c per ton, together with handling and installation costs, is saved, along with explosives handling cost and eventually, possibly, the 16c per ton for explosives themselves.

*Cost of Transportation*—Efficient car distribution and spotting in trips rather than singly means a more economical operation.

*Cost of Maintenance*—Present high cost of maintaining haulage roads and airways would be sharply reduced by reducing working places to one-fifteenth the present requirements.

*Cost of Pumping*—Elimination of the problem of handling the water resulting from breaking the strata to the surface could mean a saving of 7.8c per ton for each 100 ft below any barrier that might be established.

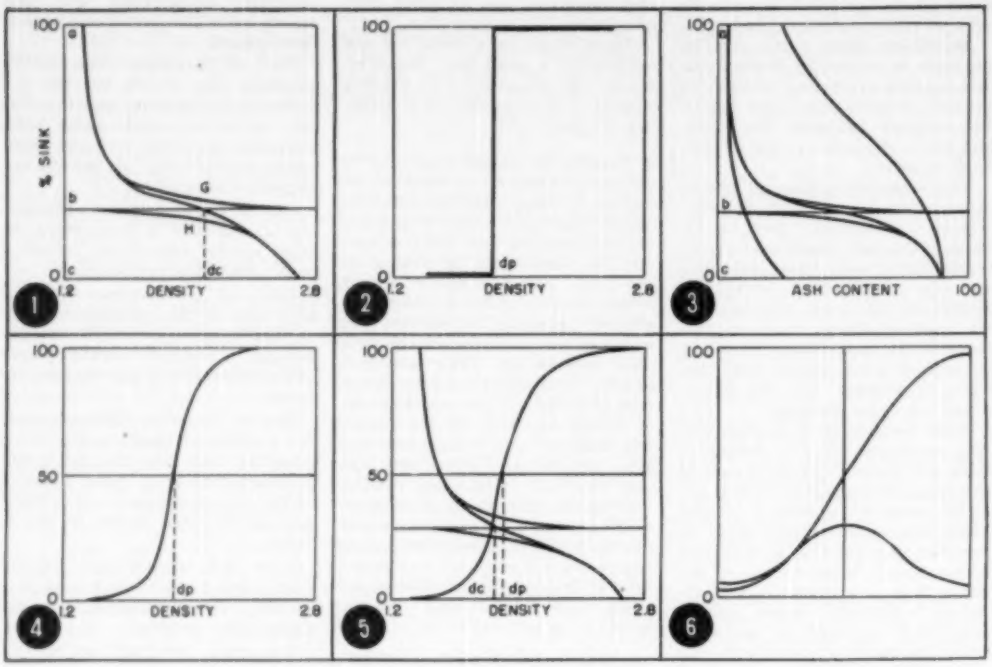
*Cost of Supervision*—Several mechanical breasts, each replacing 15 hand breasts, materially ease the supervisory problem.

*Increased Car Yields*—Eliminating roof falls, and thereby reducing the rock that must be handled with the coal, saves on haulage, hoisting, breaker operation and refuse disposal.

*Increased Yield of Domestic Sizes*—Coal mined without the use of explosives should yield more coarse sizes that will stand shipment better. If the increase was only 5%, the appreciation in the value of the product would be 30c per ton.

*Preparation of Standard Anthracite*—Since any reduction in slate, under the specifications for standard anthracite, permits an allowable bone increase of 1½ times, and since with the new machine roof rock is largely eliminated and slate in the vein itself is produced in sizes more easily removed, cleaning is facilitated, loss of good coal and bone to the bank is reduced and standard shipments can contain up to 30 lb more of the so-called impurities per ton.

• **Conclusion**—It would appear that it is entirely possible to obtain much greater safety, conservation and economy in pitch mining by substituting for the present manual methods completely mechanical operation. This study indicates that the present value of the savings of one such suggested face machine and its equipment during a 12-yr life would be over $1,000,000.




**A New Approach to . . .**

# Evaluating Preparation Results

## The Evaluation Problem and What It Means in the Design and Operation of Cleaning Plants — What the New Method Is and What It Accomplishes

By R. J. CHERADAME, Deputy Director; P. L. R. SAINT-GUILHEM, Technical Director; and P. BELUGOU, Supervising Engineer for Coal Preparation, Centre d'Etudes et Recherches des Charbonnages de France

CHARBONNAGES DE FRANCE has undertaken a general study of coal cleaning since French run-of-mine coals must always be cleaned. The organization's research center ("CERCHAR") has assigned to this task a substantial fraction of the staff.

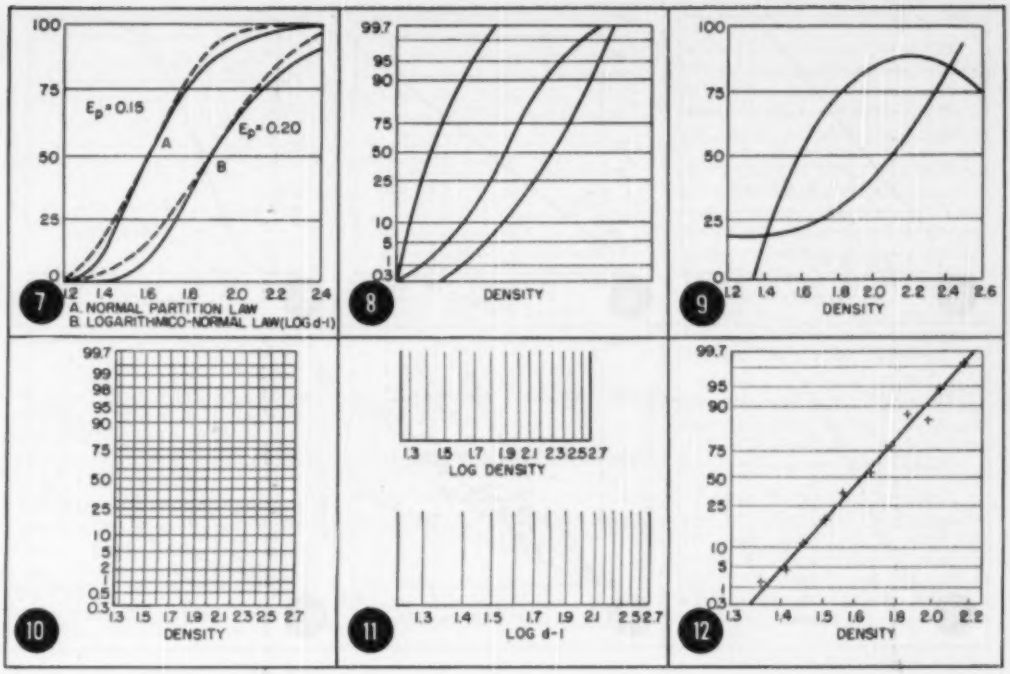
However, before undertaking any research on cleaning, and even before discussing the value of any experimental results, we must define accurately the factors involved in evaluating a cleaning operation. As technicians had not yet agreed on the choice of those factors, we were obliged to make this our first problem.

The object of this discussion is to present the solution we have obtained. It is impossible to sum up in a few pages all the research work, but a full description is given in our technical publications.

• **The Need for a Test on Qualitative Results of Cleaning**—The use of the washability curve has been long known. It permits choosing between the several possible ways of splitting a raw feed into products. Such solutions, however, are purely theoretical. All operators know that it is impossible to split a raw feed into two fractions the constituents of which would be exactly located on each side of a given value of ash content.

Classic cleaning plants in France —i.e., the ones not using dense media (Rheolaveurs, jigs, pneumatic tables, etc.)—are by themselves unable to make a perfect or even nearly perfect cut. We have, for example, laid spherical balls, according to their densities, in a scale-model jig. We observed that the pulsations destroyed the pre-established distribution.

The result of a separation depends not only upon the characteristics of the raw feed but also upon the many factors governing operation of the separating device. As a result of an experimental investigation of the action of such devices, it becomes necessary to arrive at a means of evaluating correctly but easily the quality of a separation. Many have tried to do it without success. We believe we have suc-




ceeded—at least to a degree of accuracy corresponding to the actual state of the technique.

To shorten this discussion as much as possible we shall deal only with a two-product cleaning operation; i.e., with the separation of a raw feed into clean coal and refuse.

• **Representation of Separation by Washability Curves**—For representing the results of a separation we may plot on the same chart the washability curves of the raw feed, the clean coal and the refuse. Figs. 1 and 2 show the curves plotted against density and ash content, respectively.

Such diagrams fully represent the separation and it is possible to deduce a few coefficients: area of the triangles of error, tramp error, etc. But these coefficients, like the diagram itself, depend upon the nature of the raw feed. It, therefore, is very difficult to reach, by such a process, general conclusions on the operation of a plant.

• **Partition Curve**—Significant progress has been made in the field by using the partition curve introduced by Tromp and obtained by plotting against density the proportion of refuse in the elementary layer of feed having that density. For a perfect separation, the partition curve is a broken line (Fig. 3). For an actual separation, it generally is an S-shaped line, as shown in Fig. 4.

We define "partition density" as the density of the point having the ordinate 0.5; i.e., the density of the layer split equally into reject and clean coal. That density generally is different from the "equivalent partition density"; that is, the partition density of a fictitious perfect separation which, with the same raw feed, would give the same percentages of clean and reject as the real separation, with as much refuse astray in the clean as clean astray in the refuse. For the partition density, tangents to the washability curves for the clean and the refuse are parallel, and the difference of ordinates between the two curves is a minimum (Fig. 5).

The partition curve is an interesting one, as in many cases it is nearly independent of the nature of the feed and thus characterizes the operation of the cleaning device itself. It depends upon this device and also upon the control of its operation.

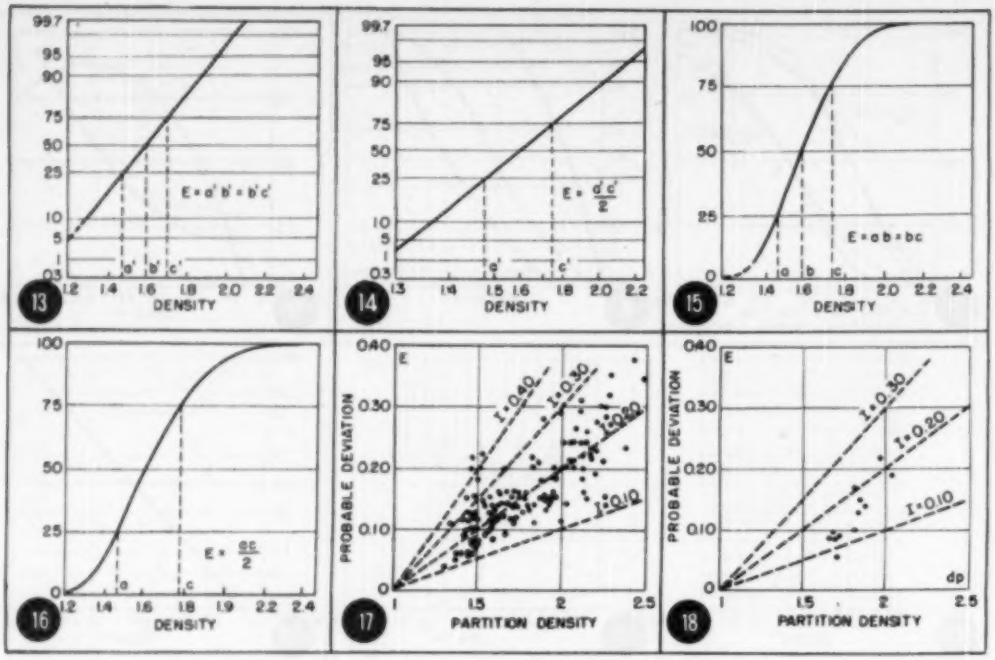
• **Characterization of Separation by a Single Numerical Coefficient**—It is practical and often even necessary to characterize the overall efficiency of a cleaning operation not by a complete curve but by one or more coefficients. That is the case when we wish to simplify the presentation of results (reports and statistical returns) or when control tests must be rapid (continuous supervision of plant operation). Therefore, operators have made various proposals for the use of coefficients, based on *a priori* reasons or on empiric considerations. None of these coefficients have prevailed.

The rational choice of a coefficient of this kind can be made only from a complete representation, such as previously described. Therefore, for the reasons set out, the best solution is to consider the partition curve.

Tromp did it when adopting the error area delimited by the partition curve and the line representative of a perfect separation with the same partition density. If the partition curves are not too irregular, this index increases as the difference between actual separation and perfect separation increases.

From the results of our many experiments we believe that it results that another coefficient is more practical; that is, the probable deviation. On the partition curve shown in Fig. 16, probable deviation is a-c divided by two; i.e., half of the difference between the densi-

## How New Evaluating Method Works and What It Provides in Results




ties of those layers, rejects of which are 25 and 75%. For a perfect separation, this probable deviation should be zero.

Probable deviation has been used for many purposes for a long time and was adopted for the investigation of cleaning by Terra, to whom is due the credit for having realized that the problem of cleaning can be regarded as one of probabilities. The S shape of the partition curve led him to assume that the curve was always normal; i.e., representing an integral of Gauss' function (Fig. 6), sometimes also termed Galton's or Laplace's function and sometimes normal law of probabilities. Therefore, the curve is completely defined by a single parameter, a mere translation not being taken into consideration. It is possible to choose as the parameter either the probable deviation or the standard. That theory was thus a considerable improvement.

From our systematic tests on many actual cleaners, it results that the assumption made by Terra is incorrect for the classical apparatus, such as Rheolaveurs, jigs and pneumatic tables. The difference from actual results is such that even Gauss' function cannot be used for an approximate study, such as layout of a cleaning plant.

We observed, however, that for these classical devices, operated correctly, a sufficiently accurate measure may be obtained by substituting for the group of "normal" curves the "logarithmico-normal"; that is, the grouping represented by Gauss' functions plotted not against density but against log of density difference, $d$ minus $d_0$, $d_0$ being zero for pneumatic tables and 1 for jigs and Rheolaveurs; in other words, practically equal to the density of the separating fluid. We may prove it at least partially by resorting to the principles of physics. In Fig. 7 a few examples of logarithmico-normal curves are given, showing how much they deviate from the normal curves.

The heavy-media devices, on the other hand, appear to have a normal partition law, but our own tests have not yet gone far enough to permit assuming that hypothesis with certainty.

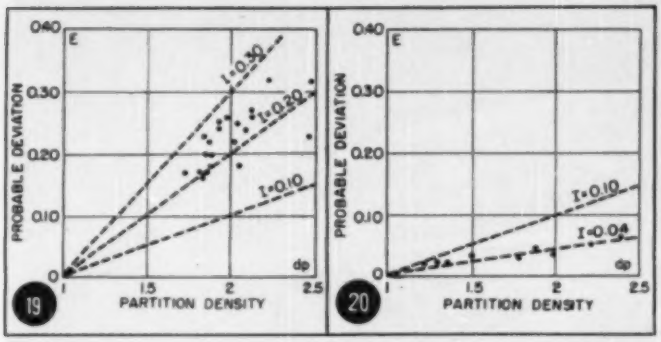
Fig. 8 shows three examples of actual curves rather frequently observed which deviate from the logarithmico-normal law. That deviation, however, cannot be related to a defect in the cleaning plant. Fig. 9 shows two other examples of actual curves. These are exceptional, and the deviation from a logarithmico-normal curve is such that cleaning must be considered as very defective and not acceptable in actual practice. It is obvious that such curves cannot be characterized by the value of the probable deflection.

• **Anamorphosis**—The use of specially ruled paper (Figs. 10 and 11) transforms into straight lines either the normal or the logarithmico-normal curves. On such paper it is very easy to determine if a few points obtained by experiment are on the same line and thus to draw in the inter-line (an example is given in Fig. 12).

Having plotted this straight line, probable deviation may be deduced graphically for a normal (Fig. 13) or for a logarithmico-normal partition law (Fig. 14). The corresponding curves before anamorphosis are shown in Figs. 15 and 16, respectively.

We have here the reason why probable deviation is more practical than the error area. For partition curves with a given geometrical shape, the two coefficients are naturally correlated. For instance, for a normal or logarithmico-normal law, $S$ equals $0.796E$. If we take into consideration the scales adopted, Tromp's coefficient equals $590E$.

• **Characteristics of a Cleaning Apparatus**—We have observed that for a given raw feed the parti-




tion curve depends upon control of operation. For a jig, for instance, it depends upon the amplitude and frequency of pulsations, water supply under the grate, etc.

For daily adjustment, exceptional regulation excluded, control is obtained by a single device. In a jig, as an example, we control the partition density by the refuse gate. Partition density is then sufficient for defining the partition curve and particularly the probable deviation. Results to be obtained by the apparatus with a given raw feed may then be forecast.

We have near completion at Malstatt (Sarre) a research station where we shall be able to vary systematically all jig controls to deduce the modifications of the partition curve. The observations from actual tests already made show that, roughly, $I$, the imperfection magnitude of the apparatus, is a constant equal to $E$ divided by $d_p$ minus 1.

• **Results Obtained With Standard Apparatus**—With jigs, we have obtained probable deviations between 0.05 and 0.45; that is, a variation of 1 to 9. Imperfection magnitude varies in most cases from 0.15 to 0.30, or 1 to 2. Fig. 17 shows location of the points representing a great number of jig experiments.

For Rheolaveurs, three devices of this type having been tested, imperfection magnitude varies from 0.10 to 0.20 (Fig. 18).

For pneumatic cleaning devices (two only having been tested), imperfection magnitude varies from 0.20 to 0.30 (Fig. 19).

These results confirm the well-known fact that it is more difficult to cut accurately when separation density increases. From another point of view they show that for the actual standard devices imperfection magnitude is in the neighborhood of 0.20.

• **Results Obtained With Heavy-Media Devices**—We have carefully investigated the Dutch cyclone and are developing other devices of our own for centrifugal treatment of fine coal.

The cyclone possesses very remarkable properties. The partition curve is independent of the washability curve of the raw feed. Against density, it is a "normal" curve when operation is normal. Probable deviation is less than 0.05 and may even be as low as 0.02. For partition densities between 1.3 and 2, imperfection magnitude is particularly low, between 0.01 and 0.04. For a medium with constant viscosity, probable deviation varies little against partition density. Fig. 20 shows representative points obtained from experiments on a 350-mm cyclone using barytes as the medium.

Some experiments with other dense-media devices lead us to believe that their properties are very similar.

• **Forecasting Results of a Cleaning Operation**—The coefficient of greatest interest from an economic viewpoint is the organic efficiency; that is, the ratio of actual yield for a perfect separation delivering clean coal having the same average ash content. We have proved that its complement to $I$, termed organic loss, is proportional to the Btu lost with the refuse.

This loss is a more interesting coefficient than the tramp error and can be calculated, like tramp error, from the washability curve of the feed and partition curve. We have proved, for instance, that for a rectilinear feed-washability curve, organic loss within the deflection range of the separation is proportional to the square of the probable error.

Some experimental investigations make it possible to determine in advance, at least roughly, the partition curve for a given apparatus adjusted a given way. We then may calculate for a given raw feed all the characteristics of the separation (yields, organic loss, etc.) as a function of variables, such ash content of clean. The calculations are somewhat long, but it is possible to deduce charts, the use of which will be very easy and with which we may obtain the best commercial treatment of a given raw feed.

We then may study the layout of a cleaning plant as rationally as any other technical layout. The details of the possibilities are scheduled for supplementary publication.

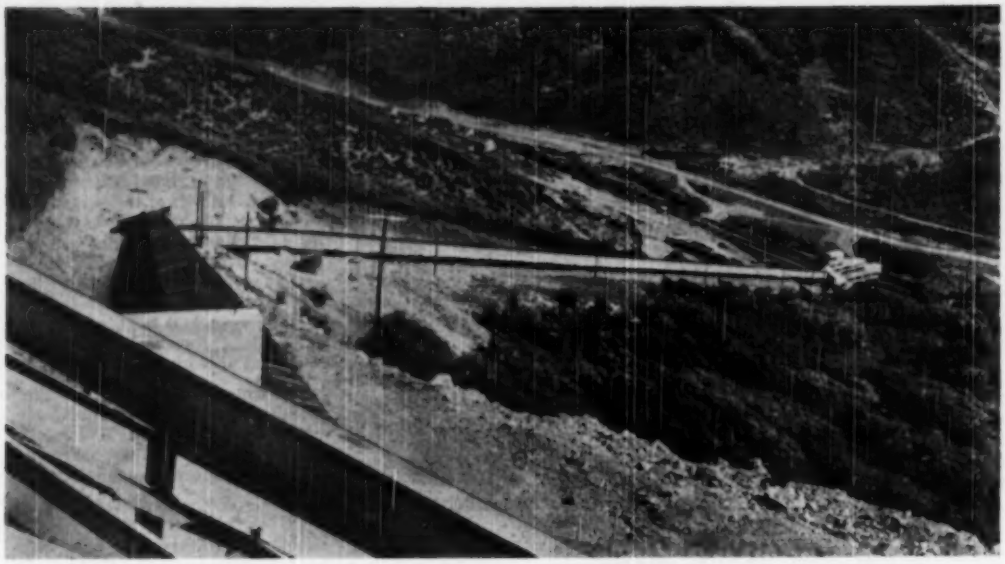
In this discussion, therefore, we shall only state that this quantitative study permits us to characterize the influence on the yields of the quality of the raw coal, as well as of the ash content specified for the clean coal. Both are considerable.

• **Comments on the Nature of the Problem**—First, the reason of the difficulties met in all studies on cleaning, and more particularly when evaluating the quality of a cut, is the nature of coal itself, considered from either a technical or a commercial viewpoint. Coal is an aggregate of many solid particles or grains, each differing from the other in geometric and physicochemical properties. A grain itself is not homogeneous and for each we might consider its average ash content, its average density, etc.

As the number of grains in a sample is very high, a satisfactory description is necessarily a statistical one and the description of a separation therefore will be statistical also.

In addition, if we attempt to build a complete theory for a cleaning device (theory being used with the meaning adopted in physics), that theory necessarily will be based on statistics.

Second, the instantaneous result obtained with the best adjustment for a feed obviously does not matter as much as the average results. Evaluation of the operation of a plant must take into consideration not only the quality of the cut at any moment but also the facility with which we may adjust the apparatus to any feed; i.e., the quality of the control devices.



**REPLACING treacherous 6-mi truck haulage, this three-stage 2,462-ft belt conveyor and . . .**

### In Two-Step Program, Edna Coal Co. . .

# Teams New Plant Flexibility With Belt-Haulage Economies

## New Three-Stage Conveyor Eliminates 6 Mi of Costly Hazardous Mountain Haulage at the Highest U.S. Coal Stripping—Modern Preparation Plant Meets Wide Range of Customer Requirements With 27 Coal-Flow Variations

A SERIOUS HAULAGE PROBLEM inherent in trucking coal over 6 mi of difficult mountain-shelf road, with enhanced hazards and costs during the severe winter months, has been effectively solved with the completion of a 2,462-ft three-section belt conveyor at the mountain-top stripping of the Edna Coal Co., in the Oak Hills district of Routt County, Colorado.

Of equal importance in the company's program of efficient mining of a quality product is the completion of a new tipple and preparation plant that offers 27 processing variations to permit the utmost flexibility in producing a variety of coal sizes. Oil treatment for all sizes, box-car loading on three tracks and centralized one-man control of all operations are among the other features built into the plant.

At an altitude of 8,000 ft, the property is the highest open-pit coal mine in the United States. It is located on the western slope of the Rocky Mountains, only 20 mi from the Continental Divide. In the severe winter weather that prevails several months of the year, temperatures drop as low as 40 below and the total snowfall exceeds 150 in.

• **Haulage Problem Serious**—The 42-in conveyor system, which lowers coal 700 ft vertically, was originated by L. M. Cooley, managing partner and a veteran mining man, to meet this serious transportation problem that had beset the Edna company since the mine was opened in 1945. As a by-product, the energy derived from lowering the coal down hill is utilized to generate electricity for the preparation plant, the set-up being similar to a hydroelectric plant generating power from falling water.

Before the new conveyor was put into operation, coal was hauled from the pit over a narrow shelf road to a tipple at Oak Creek, Colo. Haulage conditions were treacherous, necessitating among other things, driving on grades up to 13%. Loaded trucks were routed on the "wrong" side of the road for a considerable distance to avoid the dan-

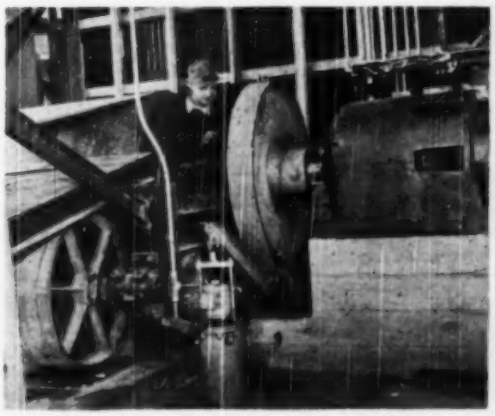
**NEW MODERN PLANT providing 27 coal-flow routings meets big problems at mountain-top stripping.**

ger of going off the shelf road. There was an extreme mental hazard for the drivers in a possible drop of several hundred feet as a result of mechanical failure or the use of poor judgment.

• **Off-Highway Haulage Cuts Costs** —With the new conveyor system, coal can be brought from the pit to the hopper at the top of the conveyor without going off company property, which adds up to a considerable saving annually in road and gas taxes. Present mining is at the extreme edge of the 2,000-acre leasehold, so that future haulage distances will grow progressively shorter. The longest haul now is slightly over 3 mi and the grades do not exceed 5%, except on the ramp out of the loading pit.

The new haulage road ends at a pie-shaped hopper where the coal starts its half-mile descent to the tipple and coal-preparation plant. The coal is fed from the 150-ton hopper (Eaton Metal Products Co., Denver) to the belt by a 60-in reciprocating feeder (United Iron Works Co., Pittsburg, Kan.).

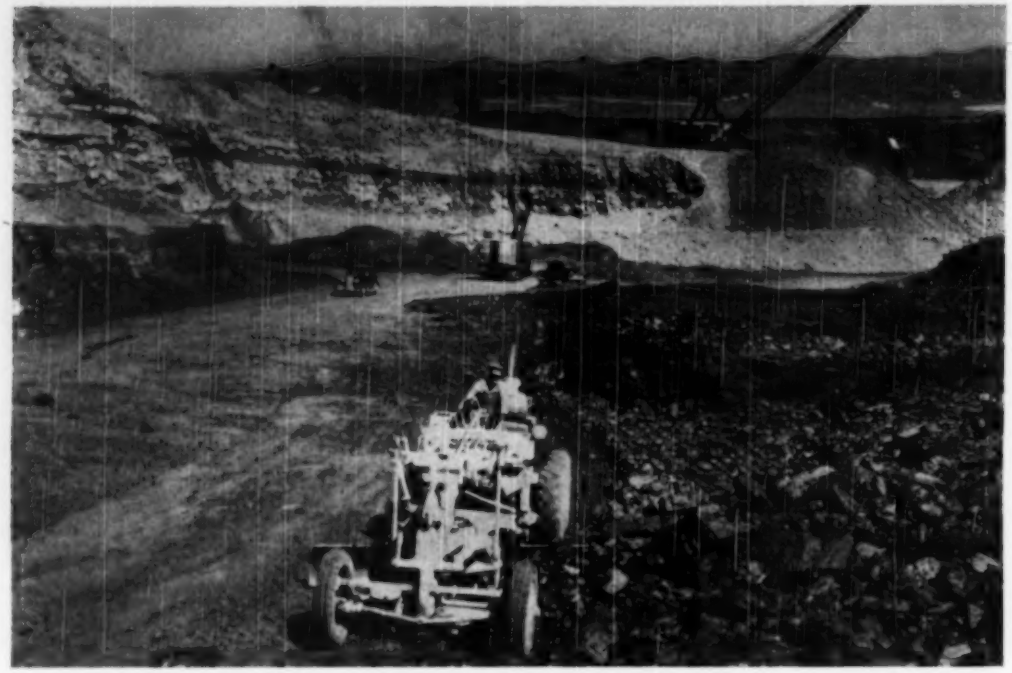
The first, or "A," belt of the conveyor system is on a 29% grade and is 711 ft long between pulley centers. It lowers the coal 192 ft vertically at 350 fpm and has a capacity of 250 tph. The 42-in belt is 5-ply 36 oz duck, with a 3/16-in rubber cover on the top and 1/16-in on the bottom, and was manufactured by Goodyear Co. for the Union Supply Co. of Denver.



HEAD PULLEY of middle conveyor is directly connected to an automatic band brake controlled by a solenoid. Induction gear-motor at right operates alternately as motor and generator.

COAL IS LOWERED a total of 700 ft vertically by this three-section 2,462-ft conveyor. Trucks discharge to a 150-ton hopper on company property at the top of the belt.

## All-Weather Operation at 8,000-Ft Altitude No Handicap at Edna Stripping



GENERAL VIEW OF EDNA PIT—Overburden averaging 35 ft is stripped with a dragline equipped with a 5-yd bucket and 135-ft boom. Coal-loading shovel in the foreground has a 1½-yd bucket, changeable to a 2½-yd bucket. Winter operating problems have been successfully solved.

• **Controls Guard Conveyor**—The A conveyor is driven by a 40-hp 1,800-rpm 440-v General Electric motor delivering 30 rpm to the head shaft. Eaton Metal Products designed and built the primary conveyor braking system, consisting of drum or band brakes of varying diameters for each conveyor. The brakes are automatically applied by GE Thrustors in the event of power failure or cut-off.

Limit switches are provided for the application of auxiliary solenoid brakes after a 7-sec time lag. Overspeeding is prevented by GE centrifugal overspeed relays driven directly from the conveyor head shaft.

Conveyor B is 1,282 ft between pulleys, has a vertical drop of 360 ft and an average slope of 15 deg. The Goodyear belting used is 6-ply 42-oz duck. The maximum tension or pull on this belt, the longest in the system, is over 6 tons when loaded. It is powered by a 75-hp 440-v GE gearmotor.

Hopper C, located at the end of Conveyor B, has a capacity of 300 tons. It was built by the Darby Corp., Kansas City, Mo., and was designed by Max Giffey, consulting engineer, of Kansas City. Conveyor B discharges into this hopper through a 60-in Holmes spiral conveyor that lowers the coal gently to prevent breakage. From this hopper, coal is fed to Conveyor C by a Holmes pan feeder 60 in wide by 16 ft long driven by a Reeves variable-speed reducer. Conveyor C, delivering to the preparation plant, has a length of 469 ft and a vertical drop of 80 ft.

• **Ample Coal Reserves Are Available for Long-Term Planned Operation**—The Edna Coal Co. has sufficient coal reserves for a 30-yr operation. Two seams are mined; the Wadge, averaging 11½ ft thick, and the Lennox, averaging 6 ft. The overburden averages 35 ft.

The coal is stripped with a Bucyrus-Monighan 5-W dragline equipped with a 135-ft boom and a 5-yd bucket. The dragline averages 1,600 buckets of overburden a day. It is electrically driven by a 2,300-v Westinghouse motor with Ward-Leonard control, and is equipped with Leschen ropes and a Model ADS Gardner-Denver compressor. In stripping, the dragline is worked uphill and follows up a series of terraces. A Caterpillar D-8 tractor is utilized in preparing the sites.

• **Winter Problems Met Successfully**—The extremely low temperatures in the winter months provide some operating difficulties that are being met successfully. The surface freezes to a depth of 4 to 8 ft in the winter. When the overburden is shot, this surface tends to lift up in large unbroken slabs. Usually, the dragline tries to hook the slabs under the edge and pull them to the bank so they may be slid into the pit. Or, they may be lifted and dropped to break into manageable pieces. Occasionally, it is necessary to drill and shoot the slabs.

Although frequently of great depth, snow is not too much of a problem in either the haulage or pit operations. With the equipment working most of the time, it is packed down or moved out of the way with a bulldozer or road-maintenance equipment.

Du Pont explosives are used in the mining operation, with 5x16-in cartridges being loaded in 5½-in horizontal holes 65 ft deep. Coal drilling is done with a rubber-mounted Hardsocg Model E-9 unit.

Coal is loaded with a Northwest

Model 6 diesel-powered shovel with a 1¼-yd bucket that may be changed to 2½ bucket if necessary. A Caterpillar No. 12 motor grader is used to clean the surface of the coal and to maintain roadways.

Haulage is done with 13 International 6x6 trucks carrying an average load of 9 tons. The trucks drive on all 10 wheels, which is especially advantageous when the weather is severe.

• **Flexibility the Keynote in Plant Design**—The new tipple was designed for flexibility and features 27 different routings at the option of the tipple foreman, so that production or elimination of any chosen size is a simple matter.

Fundamentally, the plant consists of a raw-coal tipple, to which has been added a rescreening plant for sizes under 3 in and a Jeffrey washing unit for preparation of nut and stoker coal. Provision is made for the oil treatment of any size of coal, with special emphasis on stoker. Located on the Denver & Rio Grande Western, the tipple is served by five tracks, on three of which coal may be loaded into closed cars. Ottumwa and Manierre box-car loaders are used.

The coal is discharged from the conveyor system to a 18-ft double-section scalping screen powered by a 10-hp GE motor. The two-section counterbalanced scalping screen permits feeding to or by-passing any size of coal. A single-roll crusher built by the United Iron Works Co. is located under the scalping screen preceding the main shaking screen.

The 6-ft-wide main screen also is in two sections, the upper being 65 ft long and the lower 38 ft. The sections are counterbalanced and are driven by a 35-hp GE motor. The screen has a 6-in. stroke operating at the rate of 102 strokes per minute.

The larger sizes of coal—8-in lump, 8x3-in grate and 3x1½ in—are fed by the screen to hinged loading booms, which permit lowering the coal to the railroad cars with a minimum of breakage.

• **Crushing All Sizes Possible**—The smaller sizes may be fed to the rescreening plant, consisting of a United Iron Works 72-in by 12-ft two-deck vibrating screen. Oversize may be fed to a 24x30-in double-roll stoker-coal crusher. Coal from the upper screen or the crusher may be sent to a 48-in by 10-ft Link-Belt two-deck vibrating screen. Any size coal may be crushed for the preparation of stoker coal.

All screens and chutes are provided with quick-acting doors to permit optional routing of coal through the plant with a minimum of time loss.

The oil-treating system, made by the Viking Mfg. Co., provides for heating the oil to the proper viscosity and atomization through high-pressure nozzles to obtain uniform dustproofing, particularly for the sizes used in residences or for office buildings.

The washing plant handles the 3x1½-in product, with provision for the installation of additional jigging capacity so that the 6x½-in modified mine-run eventually can be washed to economize on hand-picking costs.

• **Plant Control Centralized**—The tipple structure has a height of 78 ft above the rail, an over-all length of 130 ft and an average width of 55 ft. All electrical controls are located in one cabinet manufactured by the Atkinson Armature Works, Pittsburg, Kan. Operation of all motors, including those for the conveyor system, is controlled by one man. The control board is so located that the operator can see practically all the tipple machinery as well as the cars being loaded.

All the electrical equipment is General Electric and operates on 440 v. There are four transformer substations on the property and power is obtained from the Colorado Utilities Corp., with primary delivery of 13,200 v.

• **Communications Difficult**—Communications present a difficult problem at this operation because of the rough terrain, high altitude and snow conditions. There are three telephones connecting the different parts of the property, the Denver office and the mine office. There are 10 telephones in the tipple and on the conveyor. Another system links the machine shops and the truck-maintenance shops, which are 13 mi apart by present roads but only 3,500 ft apart air line.

Until the new tipple was placed in operation, Edna Coal leased the Moffat Coal Co. No. 2 tipple at Oak Creek for the loading and preparation of coal. The new tipple is 4 mi west.

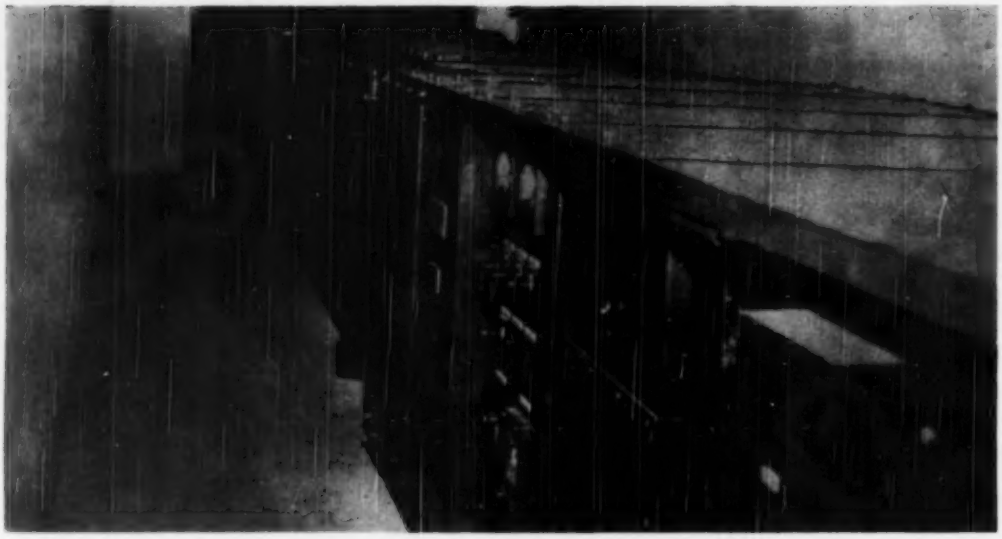
Analysis of the coal mined by the company and marketed as Oak Hills Edna coal indicates the high quality of the product. A typical as-received analysis, prepared by the Industrial Testing Laboratory, Kansas City, shows a moisture content of 6.36; ash, 5.96; volatile matter, 40.34; fixed carbon, 47.34; sulphur, 0.66; Btu, 12,259. On a dry basis, ash is 6.36; volatile matter, 43.08; fixed carbon, 50.56; sulphur, 0.70; Btu, 13,089.

• **Experienced Management**—The four general and equal partners in the Edna Coal Co. are all residents of Denver, where general offices are maintained. They are L. M. Cooley, managing partner; C. G. Cooley, president, Erie Coal Co. and Park Coal Co., subsidiaries of Cooley Bros. operating mines at Erie and Walsenburg, Colo.; N. A. Swenson, president, Nugget Coal Co., Hanna, Wyo. (also interested in oil wells at Russell, Kan.); and V. B. Smith, president, Lakeside Construction Co., highway builders and steel erectors. Mr. Smith also is interested in two independent strip operations in Colorado and Utah.

M. M. Moser, formerly with the United Electric Coal Cos., in Illinois, is general superintendent of the mine. Elmer Berglin is in charge of the pit mining and drilling, loading and overburden moving. V. C. Wright is master mechanic, with a staff of four on maintenance work. He also supervises haulage. The tipple and conveyor system is under Fred O. Murphy, foreman. Walter Leake is in charge of the mine office, and W. W. Brown is office manager in Denver.

Edna coal is marketed by the Colorado Fuel & Iron Corp., the marketing area including eastern Colorado, southern Wyoming and Nebraska, with some shipments going to the Dakotas, Iowa and Kansas. J. S. Besser is manager of fuel sales for C. F. & I., and R. R. Croke is his assistant.

The tipple was designed by the United Iron Works Co. and was fabricated by the Denver Steel & Iron Works. The construction engineer in building the tipple and conveyor system was Masami Hayashi, a graduate of Colorado School of Mines. The electrical system was designed by Ben Horton, the Atkinson Armature Works, Pittsburg, Kan., and the Paul Hunt Construction Co., Steamboat Springs, Colo., was in charge of construction. Hack Engineering Co., Denver, detailed the structural work for the tipple and conveyor. The 8x48-ft conveyor sections, each of which was trucked separately in completely assembled form over the 180 mi of mountainous highway from Denver, were built by Mack's Welding & Engineering Works, Denver.



TYPICAL OF PORTABLE UNITS in coal-mining service, this six-phase constant-voltage rectifier can be used with no fear of adverse effects on dc motor equipment. Neither motor maintenance nor losses are increased with rectifier power.

**How Do Your DC Motors Like . . .**

# Rectified Power?

## DC Equipment Can Be Operated From Six-Phase Rectifiers Without Higher Motor Maintenance or Losses

By A. SCHMIDT
Industrial Engineering Div., General Electric Co., Schenectady, N. Y.

NEARLY 20 YEARS AGO electronic drives were developed for small dc motors, using sealed grid-controlled Thyratrons. The combination of Thyratron rectifier and dc motor proved very versatile and many applications followed, particularly in the fractional-horsepower and small integral-horsepower fields. In applications of 3 hp or less, the single-phase two-tube rectifier was capable of furnishing all the power required by the motor. Where the power requirements were larger, three- or four-phase rectifiers were used.

• **Ripple and Commutation**—The single-phase rectifier was found to impose unusual duty on the dc motor in the form of large ripple currents and unusual commutation conditions. In some instances, these difficulties were met by the use of a dc choke in series with the rectifier to smooth out the current ripples. In others, the dc motor was redesigned in a larger frame size to handle the pulsating currents successfully. The deciding factor in the choice of the means used was usually economic.

The first large power rectifiers in this country were built in 1924. It was not until about 15 yr later, however, that they were applied in any considerable degree outside the electric-railway and electrochemical fields. At the start of the war, their use expanded rapidly. During the last 10 yr, literally hundreds of rectifiers, such as the portable unit illustrated, have been applied in the mining field and many more have been applied in the general industrial field. In both these fields the load consists almost solely of dc motors.

• **The Importance of Phase Number**—In view of the earlier experience with single-phase rectifier drives the performance of the thousands of motors placed on rectifier drive might well be questioned. In appraising the effects of the rectifier ripple on a dc motor, it is important to consider the number of phases in the rectifier circuit, since this has a major bearing on the nature of the motor performance.

Power rectifiers for general industrial purposes with ratings of 75 kw or more usually are built with at least six phases for both good system engineering and economics. In these ratings there is little if any economic gain in going to a smaller number of phases, while certain arrangements with fewer phases may be a source of system trouble. On the other hand, in applications of individual drives to small motors there is considerable economic gain, with no attendant system difficulty, in reducing the number of tubes to match the requirements of the drive.

Suppose we examine the output

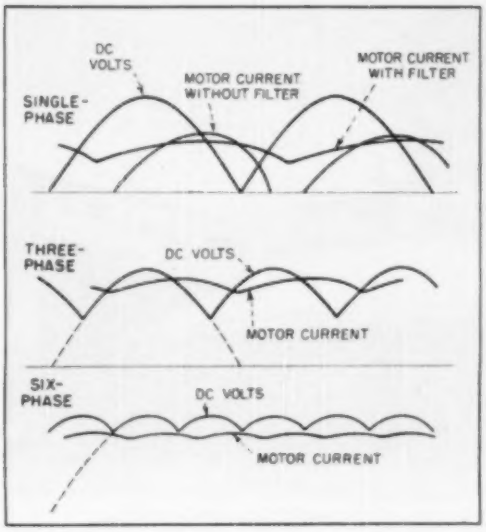



FIG. 1—TYPICAL VOLTAGE and current wave forms in a dc motor supplied by a rectifier, without filter except as indicated.

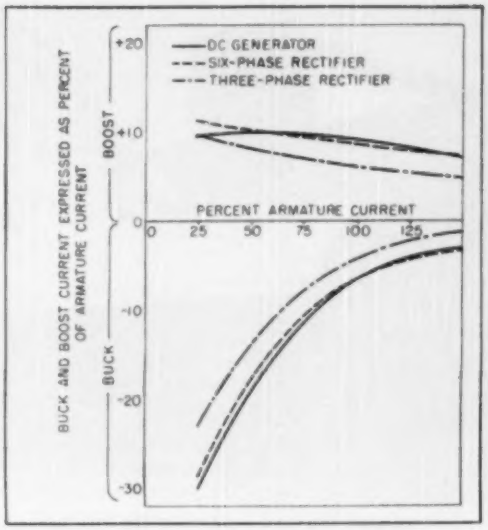



FIG. 2—BLACK-BAND commutation curves for typical dc motor at rated voltage and full field with various power sources.

voltage of rectifiers having different numbers of phases and see what effect the ripple voltage has on dc motors. Fig. 2 shows the output voltage of a single-phase rectifier with and without a filter choke, and also the output voltage of three- and six-phase rectifiers.

The current in a typical dc motor when connected to these various rectifiers also is shown.

It will be noted that the unfiltered single-phase rectifier supplies discontinuous current to the motor. Under certain conditions of speed control, where a great deal of phase retard is used to reduce rectifier voltage, the three-phase rectifier, and even the six-phase unit, may deliver discontinuous current to the motor. The illustrations with this article are based on a rectifier supplying a constant-potential bus, which is the most common arrangement for power rectifiers.

It is easy to see that a dc motor will not behave as well with a large ripple in the input current as it will with steady current. First, the ripple increases the heating value of the motor current. Second, the commutating flux does not closely follow the rapid pulsations of the current because of pole-face losses. Therefore, commutation is impaired.

• **Actual Ripple Effect**—A theoretical analysis several years ago indicated that the effect of six-phase ripple on the performance of dc motors would not be appreciable. To get more positive assurance that these conclusions were correct, heating and commutation tests were made on a 400-hp motor of normal design to compare the effect of rectifier operation with dc generator operation. Tests were made under the following conditions:

1. Dc generator supply.
2. Six-phase rectifier supply at rated voltage.
3. Six-phase rectifier phase-retarded to deliver 25% rated voltage.
4. Three-phase rectifier supply at rated voltage.
5. Three-phase rectifier phase-retarded to deliver 25% rated voltage.

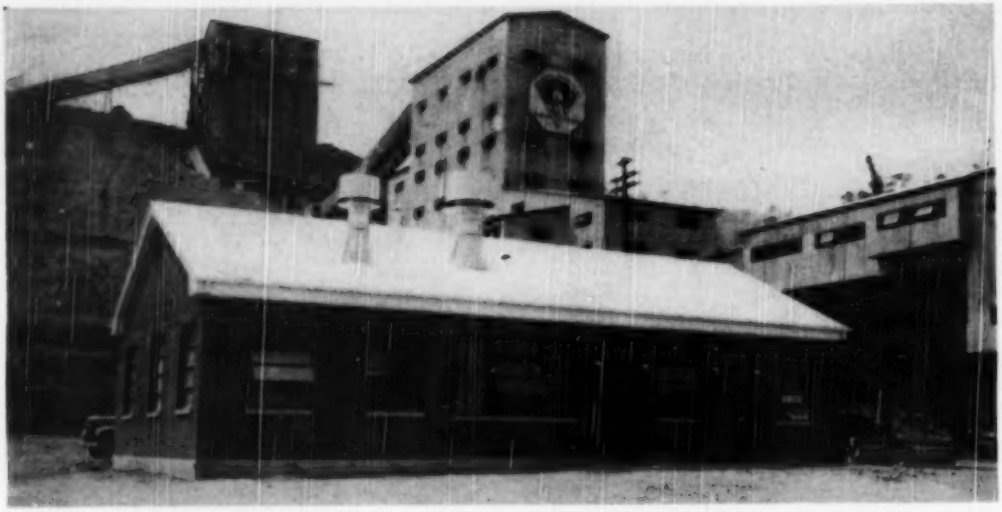
The last two tests were made to exaggerate the effect of ripple in the rectifier supply and to get a better measure of de-rating resulting from rectifier operation.

The conclusions reached from the heat runs were:

1. Motor de-rating is unnecessary when operating from a six-phase rectifier with the phase control needed to maintain constant potential.
2. Moderate de-rating, in the order of 5%, would be required when operating continuously from a six-phase rectifier at 25% rated voltage.
3. Considerable de-rating, say 20%, would be required when operating from a three-phase rectifier with considerable phase retard.

• **Commutation Results**—Results of the commutation tests are shown in Fig. 2. The black-band width is the variation in commutating pole current required to initiate sparking at a given load. It will be seen that a six-phase rectifier and a dc generator yielded practically identical black bands. Use of a three-phase rectifier, however, was accompanied by a definite reduction in commutation margin. This graphically illustrates the effect of the difference in six- and three-phase rectifier ripples. Similar results were obtained when operating the rectifiers at reduced voltage with appreciable phase retard.

The results of these tests provide an answer to the question raised in the title of this article. It is this: the owners of equipment powered by dc motors of conventional design may operate these motors from six-phase constant-voltage rectifiers without the slightest fear of increasing motor maintenance or losses. Many owners of dc motors have chosen rectifiers as a power supply because of their many advantages. These owners need no reassurance as to the wisdom of their choice. Those who have not yet become owners of rectifiers can do so with the assurance that no change in motor performance will result.



QUALITY-CONTROL HEADQUARTERS—New laboratory at Arkwright serves all Christopher Coal Co. operations.

# Precision Control Assures

## How Modern Arkwright Facilities Function to Provide Immediately Useful Data to Mine and Preparation Officials Responsible for Shipped-Coal Quality

By G. M. STEELE, Christopher Coal Co., Pursglove, W. Va.

**LABORATORY FUNCTION — Providing operating officials with the information necessary for adequate quality control**

ASSURING CUSTOMERS a uniform product of the highest quality was the principal objective in establishing sampling and analysis procedures and erecting a new modern laboratory at the 10,500-tpd Arkwright mine of the Christopher Coal Co., Monongalia County, West Virginia. Output of the newly modernized operation, described in detail in *Coal Age*, December, 1949, is shipped primarily as steam coal to public utilities, railroads, industrial accounts and retail dealers.

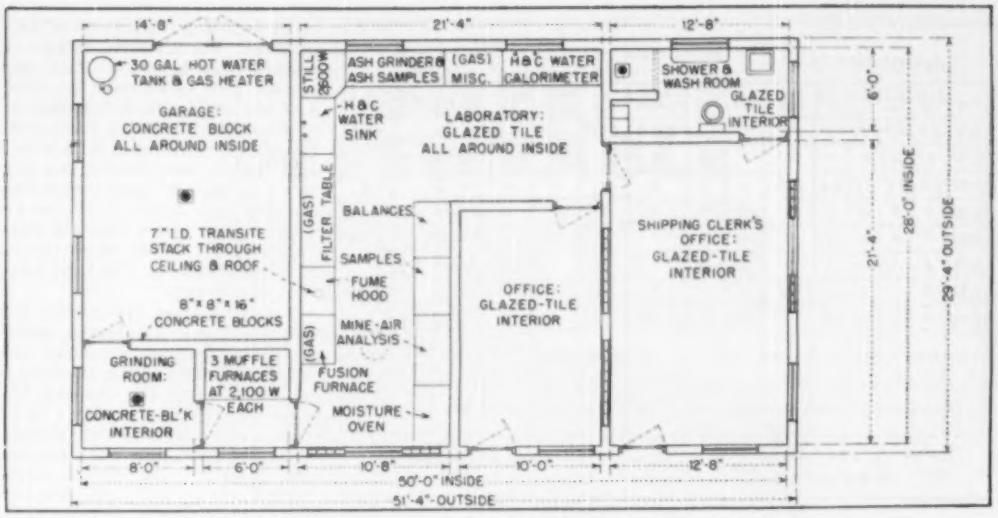
Under the organizational set-up of the Christopher Coal Co., preparation is the direct responsibility of operating personnel. The mine superintendent, mine foreman, section foremen and tipple foremen all are held accountable for the quality of coal shipped from their mine. The function of the laboratory department is to furnish these operating officials with the information necessary to maintain adequate product control. Copies of all analytical reports go to the vice president in charge of operations, the general superintendent and the sales department, in addition to the mine superintendents.

**DESIGN OBJECTIVE—Simplified and streamlined procedures supplying mine and preparation officials with data for maintaining the quality necessary in a competitive market**

In setting up the entire program, management has attempted to keep the operation as simple and streamlined as possible, while at the same time providing the information necessary to maintain a high-quality fuel that can be sold in a very competitive market. Results thus far have indicated that it has been successful in both respects.

One of the first projects of the laboratory personnel was a washability test of the raw-coal feed to determine the correct specific gravity for operation of the Arkwright cone. A 12-ton feed sample was collected over a two-day interval and was screened at 2, 1¼, ¾, ½ and ⅜ in, and at 4, 8, 16, 30, 50 and 100 mesh. Float-and-sink tests were made on each size component at specific gravities of 1.35, 1.40, 1.45, 1.50, 1.55 and 1.60. Ash and sulphur analyses then were made on each portion of the sample. From the resulting washability curves, 1.50 was established as the best specific gravity to be maintained in the plant, based on the ±0.10 curve.

At the Arkwright mine, 5x⅜-in coal is cleaned by the Chance sand-flotation process. Plant control of the washed coal is maintained by regular float-and-sink test at 1.50 sp gr on samples of refuse and ¾x⅜-in washed coal. The tests are made each shift and daily reports are made to the laboratory, thus providing a permanent record of the quality of coal shipped on any particular shift. Float material in the refuse is not permitted to exceed 2%, while sink in the cleaned coal, consisting mostly of near-




LABORATORY LAYOUT provides for fast streamlined production of data necessary for quality control.

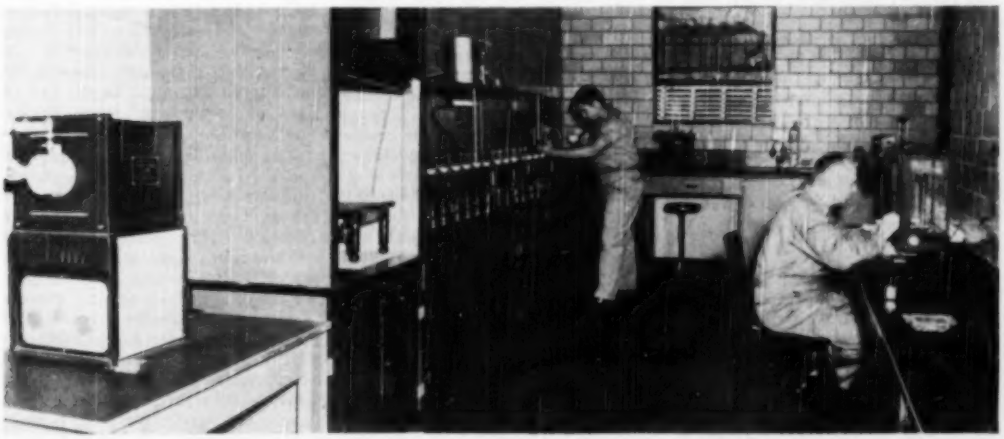
# Quality Coal Preparation

gravity material, is kept under 1.5%. In addition, a sample of the sized coal is taken at least once a week for an ash analysis, which serves principally as a check on the washer-operation reports.

There is no surface preparation of the minus-$\frac{3}{8}$-in coal. However, an automatic sampler incorporated in the design of the tipple provides an accurate sample of the $\frac{3}{8}$-0-in coal loaded on each shift and these samples are analyzed at the laboratory.

Any fluctuations in ash percentage shown by these $\frac{3}{8}$-0-in samples are reported to the mine superintendent within 24 hr, which enables him to review mining methods and take any corrective action indicated. The automatic sampler also furnishes samples for moisture determination. Moisture percentages are calculated daily and the results also are immediately reported to the mine superintendent.

In addition to this program for Arkwright, the laboratory equipment and personnel are the basis for product control at Christopher Coal's other four mines, Pursglove Nos. 8 and 15, Brock and Booth. Since all the operations except Booth have cleaning plants for their sized coals, practically the same procedure is followed as at Arkwright.



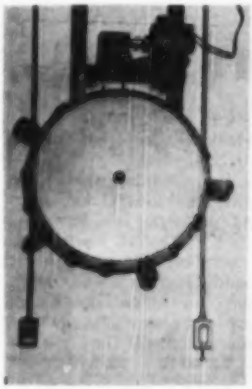
LABORATORY FACILITIES include (left to right) fusion furnace, fume hood, filter table and balance. The interior is glazed tile.

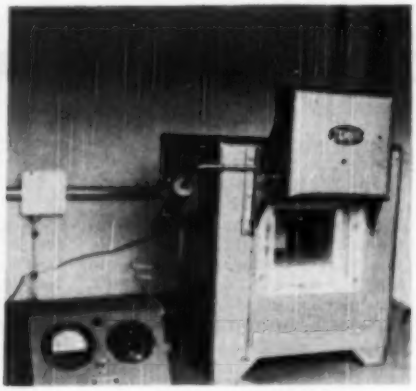
ARKWRIGHT Mine WASHER REPORT Shift DAY
Date 12/4/49

| Time | Gravity valves Setting Top | 2nd | 3rd | Btm | Clean Valve | Agit. Amps | Sand Pump Amps | Water Pressure | Feed T.P.H. | Sp.Gr. Water | Sp.Gr. Test | Size | Per Cent Float | Per Cent Sink |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8:15 | 2.5 | 2.5 | 2.25 | 2.25 | 2.5 | 10 | 52 | 32.5 | 650 | 1.5 | 1.5 | ½x1½ | | 1.4 |
| 8:30 | " | " | " | " | " | " | " | " | " | " | " | REFUSE | 1.3 | |
| 8:45 | 2.0 | 2.0 | 2.0 | 2.0 | 2.5 | " | " | " | " | " | " | ½x1½ | | 0.8 |
| 9:00 | " | " | " | " | " | " | " | " | " | " | " | REFUSE | 1.1 | |
| 11:00 | " | " | " | " | " | " | " | " | " | " | " | ½x1½ | | 1.0 |
| 11:15 | " | " | " | " | " | " | " | " | " | " | " | REFUSE | 1.4 | |
| 1:30 | " | " | " | " | " | " | " | " | " | " | " | ½x1½ | | 1.1 |
| 1:45 | " | " | " | " | " | " | " | " | " | " | " | REFUSE | 1.4 | |

Sand added during shift 4000 lbs.
Remarks:- Sand added at 8.30
Signed Donald Lennart

WASHER REPORT includes data on tests made each shift and reported daily to the laboratory. These reports provide a permanent record of coal quality.





LABORATORY EQUIPMENT includes wheel for mixing samples (left) and muffle furnaces.

Samples are collected daily by tipple personnel and taken to the Arkwright laboratory for processing.

## OPERATING PRACTICE—Use of modern equipment and procedures to assure a fast-moving and thorough control job

Arkwright laboratory facilities include the modern efficient equipment required to do a fast-moving thorough job of quality control housed in a separate building adjacent to the Arkwright tipple. Designed by J. H. Gwynne, chemist, and J. W. Murry, construction engineer, the building is of fireproof construction, with a red-brick exterior and a glazed-tile interior. The inside dimensions measure 50x28 ft, with space for a shipping clerk's office and a truck garage.

A Jeffrey hammermill for crushing all samples, except those taken in the tipple by the automatic sampler, is located on the river loading dock. The crusher reduces the samples to approximately 8 mesh and they then are riffled down to about 5 lb with riffle buckets. Location of the crusher on the dock eliminates handling the rejects, since they go directly from the riffles into the barges.

The 5-lb sample then is taken to the laboratory, put in a drying oven and left overnight. Air in the drying oven is circulated over heating elements to maintain a temperature of 15 to 20 deg C above room temperature. The air-dried sample is crushed to 20 mesh in a Braun pulverizer, then riffled down to about 4 oz in a small riffle and pulverized to minus-60 mesh in the Braun pulverizer. For mixing, a 30-in wheel with the rim beveled to 45 deg has 16 bottle lids 6 in apart fastened to the rim. It is driven at 15 rpm by a ¼-hp motor with a reducing gear. Samples stay on the wheel for 30 min, which assures a uniform mixture of the pulp.

From the wheel, the samples are transferred to sample bottles, which are given a laboratory number that is recorded along with a description of the sample. Ash analyses are made by weighing exactly 1 g of each sample into tared shallow porcelain crucibles. The crucibles are placed in a cold electric muffle furnace and gradually heated to 750 deg C, remaining at that temperature for 2 hr to assure ignition to constant weight.

Samples for moisture determinations are obtained in 10-gal G.I. cans with tight-fitting lids. They are crushed in the Jeffrey crusher, riffled to about 5 lb and then placed in air-tight containers for transportation to the laboratory. There they are weighed in tared drying pans, placed in the drying oven and dried to constant weight. The loss in weight is reported as the percentage of surface moisture. Inherent moisture is determined by weighing 1 g of the 60-mesh sample into a tared crucible and placing it in a Fisher Isotemp oven for 1 hr at a temperature of 105 deg C.

Sulphur analyses are made according to ASTM Standard D271-48, following the Eschka method. In determining volatile matter, ASTM D271-48 is followed, using a Meker burner. Btu calculations are run on a Parr adiabatic calorimeter. A Barrett fusion furnace, supplied by the Burrell Technical Supply Co., is used to determine ash-softening temperature.

The laboratory is fully equipped for the work carried on and includes, among other items, the following supplied by the Fisher Scientific Co.: Ainsworth DLB chainweight balance; Burnstead water still; Ro-tap sieve shaker (Tyler); U. S. Standard sieves; Temco electric muffle furnace with temperature controllers; Precision distilled-water heater; Fisher Isotemp oven; and Fisher Utilized laboratory furniture, including fume hood. The air-drying oven, balance table and funnel rack for 16 funnels were made in the company's shops.

# SAFE DEPENDABLE POWER

## SPEED UP your haulage and SAVE with EXIDE-IRONCLAD POWER

With Exide-Ironclads in your battery-powered shuttle cars, locomotives and trammers, you get all these time-saving, cost-cutting, tonnage-boosting benefits...

- instant starting and fast acceleration.
- safe, flexible haulage—quick car changes, less idle loader time, higher main line tonnage.
- uniform speeds maintained for entire shift.
- no unscheduled down time, hence more production per man per shift.
- low operating and maintenance costs.
- exceptionally long life.

These advantages are made possible by the construction of the Exide-Ironclad which is different from any other battery. Its superior characteristics and long life—proved in more than 100,000 heavy duty jobs make the Exide-Ironclad Battery the best power buy—at any price.

THE ELECTRIC STORAGE BATTERY CO.
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"Exide-Ironclad" *Reg. Trade-mark U.S. Pat. Off.*

*1888 . . . DEPENDABLE BATTERIES FOR 62 YEARS . . . 1950*

# Safety Is a Religion

By R. W. KIRKLAND, Safety Adviser
Industrial Commission of Ohio

SAFETY PROMOTION is a phase of industrial activity that can be made to pay large dividends in employee welfare, actual dollar savings and improved mine efficiency.

Recognizing the importance of safety, we realize that there is no miracle that can prevent accidents. We in the mining industry realize that accidents cannot be stopped by knocking on wood or by hoping for lucky days. We are certain that to have safety in our mine we must want it and be willing to work for it.

If accidents could be prevented by posters such as "Watch That Roof" or by guards on mining machinery, safety would be a fairly simple matter. The big job is to educate men to think in terms of safety—to recognize potential dangers and to avoid them. For this reason, I am going to talk for the most part about the prevention of unsafe acts rather than the elimination of unsafe conditions.

Accidents resulting from unsafe acts usually occur because of one of these two conditions: either a new employee on the job has not been properly instructed, or an experienced employee has formed unsafe habits. With regard to the new employee, the importance of properly instructing him cannot be over-estimated. He must be sold, shown and then closely supervised to see that he does follow the safe procedure. If this is done, and only safe habits are formed, it is unlikely that he will be hurt.

With reference to employees experienced on the job, we often find that they have formed unsafe habits. These habits may eventually result in an accident unless they are corrected.

I am convinced that hundreds of accidents can be blamed on preoccupation. The mind is working all right, but on some other subject. I might illustrate this point by asking you if you do not often get up in the morning and immediately occupy your mind with plans for the work you are going to do that day. You dress, eat your breakfast, and drive to work while consciously thinking of other things. This is also true of the man in the mine who has done the same job many times. So we recognize that employees work by habit, and unsafe habits eventually lead to accidents.

Since this is true, the logical question to ask is why some workers perform their tasks in an unsafe manner but never have accidents. The answer is that unsafe practices may not lead to an injury unless other circumstances coincide. An employee may become over-confident in practicing an unsafe act, or he may be under par, physically or mentally, on a certain day.

These illustrations show why a workman may be able to tell you that he has been taking a certain risk for 20 yr with no accident resulting. This means that an emergency has never occurred, that he has not become overconfident and that he has always been alert. However, something that hasn't happened in 20 yr may occur within 10 sec.

Recognizing that we do have unsafe habits practiced in our mines, the big question is: How can these be changed to safe habits? We realize that posters and printed safety rules help in making employees safety-minded. However, we feel that the medium of "person to person" talks between foreman and worker is the most effective way to correct unsafe habits. These personal safety contacts between the foreman and employee have a twofold benefit. They are not only the best method of selling safety to the worker but they also provide an excellent means of promoting good labor relations. A keen personal interest in the life and safety of the employee is most desirable.

Although I have, for the most part, stressed the supervisor's share in the safety program, I want to point out that an effective program must have the cooperation of everyone concerned.

Until now, I have not mentioned the part of the safety director. I have done this for a reason. Some people have the mistaken idea that the accident-prevention job is the responsibility of the safety director and that no one else need worry about safety. If this feeling exists in the mine, I am afraid that little safety progress can be expected. Safety is a cooperative effort which the safety director must coordinate and guide. However, he cannot be expected to do the entire job alone.

Now we come to the most important individual in any safety program. He is the worker, the one who suffers the injury and the one who must practice the safe working habits. Without his suggestions and cooperation, maintaining a good safety program is impossible.

Abstracted from a paper presented at the 19th All-Ohio Safety Congress.

## For heavy duty conveyors—

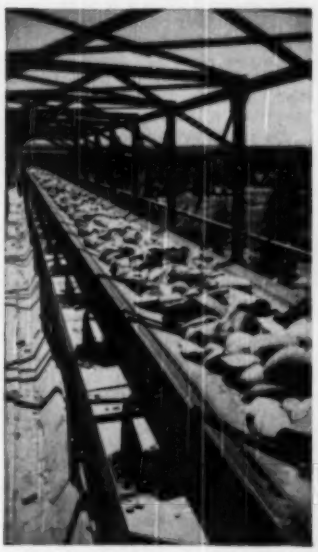
# IT'S TIMKEN®...

For over 25 years Timken tapered roller bearings have given long, trouble-free service in heavy duty conveyor applications—just as they have throughout all industry. A typical example is this 1¼ mile system at the National Cement Company, Ragland, Alabama. With over 10,000 Timken bearings in its Continental Gin Company idlers, this conveyor has been moving 200 tons of cement rock and shale an hour since 1941—and at the lowest ton-mile cost in the company's history! Bearing replacements have been negligible.

# AND TIMKEN...

This installation at the Raleigh Coal and Coke Company, Raleigh, W. Va., moves 150 tons of coal per hour on 534 Jeffrey idlers equipped with Timken bearings. Timken bearings have unusual load-carrying capacity—take radial and thrust loads in any combination. Idler friction is practically eliminated. Belt wear is reduced. Effective seals keep lubricant in, dirt and moisture out. Lubrication and maintenance is minimized.

# AND TIMKEN AGAIN!



83,000 Timken bearings in Rex idlers kept sand and gravel on the move over the world's longest conveyor for Shasta Dam. It was 9½ miles long and handled over 12,500,000 tons. After this grueling service all the Timken-equipped idlers were transferred to other jobs and are still in operation. There's no other bearing with so much to offer, no other bearing so fully proved. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

*Wherever the going's tough industry turns to*

**TIMKEN**

**TAPERED ROLLER BEARINGS**

Typical application of Timken bearings for conveyor idlers.

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◎ AND THRUST →◎← LOADS OR ANY COMBINATION ✳

# Plug the Hole in the Dike—Now

REMEMBER THE DUTCH BOY who plugged the hole in a dike with his thumb? He prevented disaster by attacking a bad situation in the nick of time. Small leaks need only small plugs, but if the plugs are not placed in time, dire consequences usually follow.

Coal is in a competitive battle, and the battle is getting hotter all the time. This is not a fight to the finish—we shall always need coal—but it *is* serious, because the encroachment of other fuels on coal's market may force curtailed operations at some mines. You know which ones—the high-cost producers.

High costs are a reflection of tough mining or cleaning problems, or of low efficiency. Waste is one sign of low efficiency; it is the hole in the dike.

Consider the following points.

**Do you know how many** different supply items are issued to the men in your section? You will be impressed by the number of necessary aids to successful mining.

**Do you know how much** each item costs? Your maintenance foreman and superintendent have the figures and they will amaze you.

**Do you know the proper use** of each item? Improper application means waste. Therefore, get full benefit from everything that comes into your section. Wear it out in service—don't let it lie idle because you don't know how to use it. Knowing will come from asking and reading.

Now, let's be specific. Read on, and see if any of these shoes fit.

Firing cable makes a wonderful extension cord. Is any of your cable ending up in private garages?

Lamp bulbs have the ugly habit of burning out. The easiest way to solve the problem is to have a company bulb on hand. But that's hard on the cost sheet if too many get the habit.

Have you ever seen an expensive wrench used as a hammer? It's done quite often—too often.

Friction tape has a habit of disappearing. New-type insulating tapes have low unit cost, but think of the miles of tape used in the industry. A small percentage of waste involves a sizable pile of money, therefore.

Timber and brattice boards are expensive. Is any of this material buried or left to rot in your section? Use old stock first and order wisely so you will always have plenty, but never too much.

Dull tools waste labor, and labor comes high. Check the condition of individual and company tools, and send broken tools to the shop. Is there a broken pipe wrench or jack in your section?

After one of your machines has been lubricated, is there enough excess grease on the fittings to service another machine?

These are a few of the leaks that could reach flood proportions in an average mining company. The cost penalty your company suffers in waste is becoming more important all the time. A united assault on waste is necessary for efficient mining, and efficient mining is necessary to win the competitive battle. This is a job for the "front-line" supervisor.

One of the producers in your section may be working for nothing! Here's what we mean. If all waste could be totaled in dollars and cents and this figure was divided by the net profit on a ton of clean coal, you would, of course, learn the number of tons required to offset waste alone. It might equal your tons per man-day figure. A little study and record-keeping will lead you to a good estimate of total waste. The result of the calculation will be revealing.

## Any Suggestions?

COAL AGE will be happy to publish in Foremen's Forum any waste-elimination tip you can suggest to other bosses. We think these men would place only two conditions on such suggestions. They would want to be sure that (1) you have tried it yourself, and (2) you found it effective. COAL AGE also will be glad to pay you at regular rates for any of your waste-elimination ideas published.

# Use Workers' Complaints To Your Advantage

YOUR MAJOR DUTY is listening to complaints—or so it seems when gripes are coming thick and fast. Using them to advantage seems a remote possibility, but let's explore it nevertheless.

Consider your men in the light of the complaining they do. Some men are always finding fault, others never complain and still others will speak up only when something is radically wrong in their judgment.

**The chronic complainer** will usually have one of three reasons for his attitude: He likes to hear himself talk, he wants to stir up trouble or he enjoys making you look foolish in the eyes of the other men. He is a big problem, but smoother crew performance will result as you tone him down. About the only way you can beat him at his game is to prove him wrong so often that he finally gets wise himself or the other men refuse to listen to him. To do this, you must anticipate his complaints and then be armed with facts to blast his arguments. Take care of his justified complaints until he gets the idea that you will consider and do something about his real troubles. When you stop this fellow you get smoother operation, and there's one advantage of knowing your men and having a plan.

**Some won't complain at all,** and this group usually consists of two entirely different types of men. One is the happy young guy who is going somewhere in the organization, and knows it. He only wants to work and get ahead because he knows that things will be better when he reaches the next rung of the ladder. All he needs is occasional encouragement — and please give it to him, for the future of the industry depends on him.

The other type is the man who won't mention the fact that something is bothering him but broods over real or imagined grievances. He can build up a powerful pressure head of resentment over nothing at all. The remedy would seem to be bleeding off some of this pressure by putting your finger on his troubles and then talking to him about them. In other words, keep things in the open where air can get at them. As to why you should worry about a man like this, remember that preoccupation lays him wide open to injury. The advantages are all yours if you keep him safe and can finally convert him to the next type of man.

**Good workers complain in no uncertain terms** when something is really eating them. They know their rights and they assert them without prejudice. These men present complaints with supporting facts, and it pays to listen. They are a big help to you even while they complain, because if something is wrong in your section you want to know about it, and here you're getting it straight. Get all pertinent facts, be sure you are both talking about the same thing, and then do all you can to clear up the situation by reconciling the interests of the man and the company.

This group keeps you on your toes. You have to think to stay one step ahead of them, and that is where you want to be.

Complaints, like death and taxes, will always be with us. However, their shock can be cushioned by advance preparation and planning of your complaint-handling procedure. Study your company—know its limitations as far as filling demands of the men is concerned. Know all the advantages of working for your company. The complainers will know all disadvantages. Arm yourself with facts, even if you must defer an answer while you take time to search.

Handling complaints isn't a distasteful part of your job. It is a challenge, and the more complaints you handle in your section the fewer formal grievances will be going over your head to your superiors.

# Get these savings in your clutches

• If you're looking for increased loader efficiency, don't overlook the importance of clutches. There is much evidence to prove that better clutch operation cuts maintenance costs and boosts tonnage. The evidence is equally clear that SUPERLA Mine Lubricants contribute to efficient clutch operation in at least three important ways:

**Eliminate Warm-up Time** SUPERLA Mine Lubricants are fluid at low temperatures. When machines start, the lubricant readily flows over clutch plates. This eliminates drag, permits loading operations to be started immediately.

**Shorten Loading Time** SUPERLA Mine Lubricants keep clutch plates clean and free for action. This allows smooth operation of clutch controls. Machines can be handled more easily. Loading takes less time.

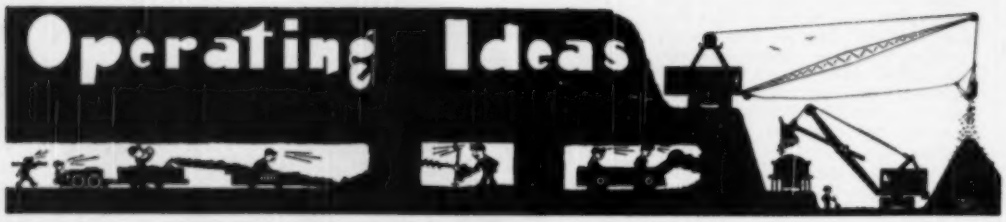
**Reduce Repair Costs** SUPERLA Mine Lubricants do not thin out excessively at machine-operating temperatures. This quality assures proper lubrication of clutches during long periods of continuous operation. Safer and cleaner lubrication keeps clutch maintenance at a minimum. Loaders stay on the job longer, load out more coal.

**Superla**
**Mine Lubricants**

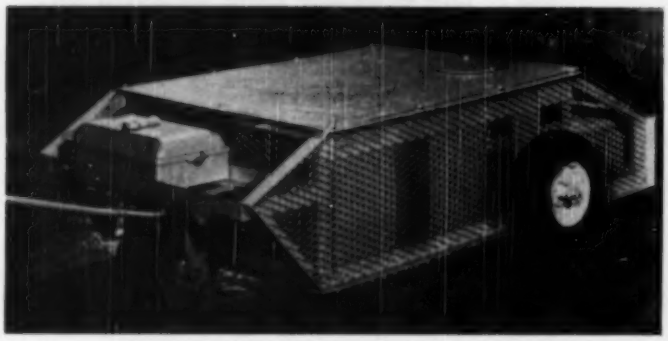
A trial of SUPERLA Mine Lubricants in your equipment will prove their ability to make savings for you. Grades are available for both oil- and grease-lubricated loaders. Ask for the services of a Standard Oil Lubrication Engineer.

Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

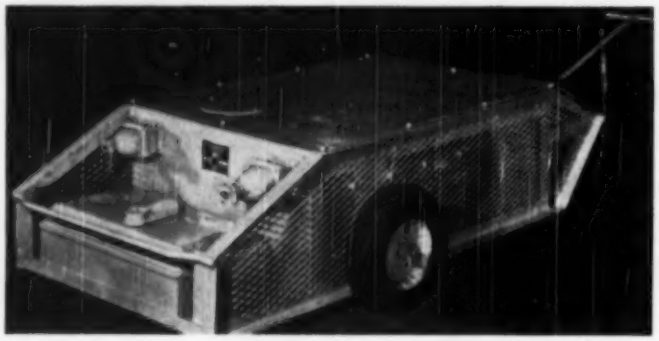
**STANDARD OIL COMPANY (INDIANA)** STANDARD




# Rubber-Tired Substations Maintain 220-AC Voltage at Face



PORTABLE RUBBER-TIRED SUBSTATION includes both capacitors and transformers. The circuit breaker on the front controls 220-v power supplied to the cutting machine.



REAR OF THE UNIT is equipped with a 440-v circuit breaker for incoming power and two lever-type plugs and receptacles for 220-v cables.

UTILIZATION of rubber-tired ac substations or load centers at a mine in West Virginia has offered a new approach to the long-standing problem of supplying 220-v ac power to face equipment without a serious voltage drop and without carrying high-voltage lines into the sections. These portable power centers, consisting essentially of transformer substations, include capacitors which reduce the voltage drop and help improve the power factor of the total mine load.

The mine is in low coal and is operated hand-loading, with conveyor haulage from working places to the outside. The remaining life of the opening is about 2 yr and the maximum distance from the portal to the farthest working place probably will not exceed 3,700 ft.

## Units Placed at Room Necks

Power is taken in via the portal at 440 v to the portable load centers located at the room necks. Thus, the long-distance transmission of 220 v and the complications involved in installing 2,300-v cables to meet requirements of the W. Va. Department of Mines are avoided. The state department does not sanction the use of 440 v on face equipment.

The load centers, developed and built by the Long Super Mine Car Co., Fayetteville, W. Va., have a 30 kva capacity, which is sufficient for the cutting machine, electric drill and conveyors used in one room.

## Breakers Protect Circuits

Components of a load center include three dry-type 10-kva transformers, four 7½-kva capacitors, one DeIon 440-v 100-amp circuit breaker, two 220-v circuit breakers and two receptacles and plugs. The lever-action-type plugs were manufactured by the Ensign Electric & Mfg. Co., Huntington, W. Va., and the major electrical equipment was supplied by the Westinghouse Electric Corp. One of the lower-voltage circuit breakers, rated at 220 amp, protects the cutting-machine circuit and the other is for the room conveyor.

The portable load centers, which are the first to be built by the Long company, are only 22 in high and weigh 1,200 lb. The manufacturer has plans for putting the same equipment on a truck of lighter weight and still smaller dimensions, and can add ground-trip equipment to meet specific conditions. Since explosion-tested models are not being planned, their use in fresh air only is being advocated, although they can perhaps be installed to supply power to explosion-tested face equipment through explosion-tested cables and connections.

## Applicable to Contour Mining

For underground contour mining following outcrop stripping, 440-v three-phase transmission from portal to room neck is satisfactory, since the main entries seldom exceed 2,500 ft. Even if mechanical loaders and shuttle cars are used in connection with belt-conveyor main haulage, a 440-v distribution and 220-v room power system can be used if the shuttle cars are battery-operated.

To install capacitors as close as practicable to face equipment has always been a problem with ac underground power. With these rubber-tired load centers, the distance between capacitors and equipment averages only half a room length.

# MACK MODEL LR...15-TON DUMP TRUCK

## Keeps the Shovels HUSTLING

## ...Payloads Moving FAST

● Feature by feature—in every part—Mack Model LR is engineered to keep earth, rock, coal and ore moving away from the shovel—fast.

Regardless of weather or terrain, Model LR maintains positive traction through slippery mud or over uneven ground because of Mack's exclusive Power Divider differential. Power steering, air-assisted clutch, offset driver's position, proper weight distribution—all contribute to easy handling ...assure nimble maneuverability...fast, profitable hauling.

Study the standout features Model LR brings to your job. Compare them, point by point, with any other make of truck for off-highway dump work. You'll find they all add up to give you increased profits through faster time cycles and greater output at lower cost.

**AMPLE HORSEPOWER:** Standard engine, 196 h.p.; other engines from 150 h.p. to 306 h.p. Available in either gasoline, diesel or butane types.

**MACK POWER DIVIDER:** Assures good going through mud and over uneven ground by effectively transferring power to the wheel having the best traction.

**MACK DUPLEX TRANSMISSION:** Eight forward speeds provide a ratio range to meet the requirements of every off-highway hauling condition.

**AIR-ASSISTED DOUBLE PLATE CLUTCH:** Makes possible almost effortless operation; reduces driver fatigue to a minimum.

**MACK PLANIDRIVE REAR AXLE:** Three-pinion planetary final reduction gears located outboard of each wheel, provide large reduction without excessive size of carrier, differential or axle shafts.

**POWER STEERING:** Hydraulic power steering is shock-proof, positive and fast—gives easy, effortless control.

**MASTERFUL AIR BRAKES:** Air-actuated brakes have nearly 1000 square inches of braking area properly distributed, front and rear, to assure fast, positive and effective braking on all four wheels.

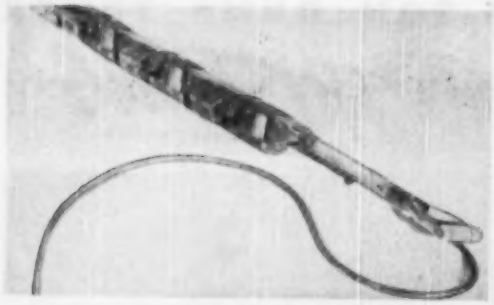
**RUBBER SUSPENSION:** Mack rubber Shock Insulators on front springs and rear axle support-arms eliminate twisting strains, absorb vibration, require no lubrication or adjustment, and last indefinitely.

*Be Profit-Wise*

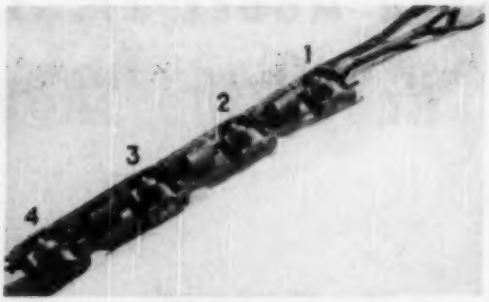
**MODERNIZE WITH**

Mack ...outlasts them all!

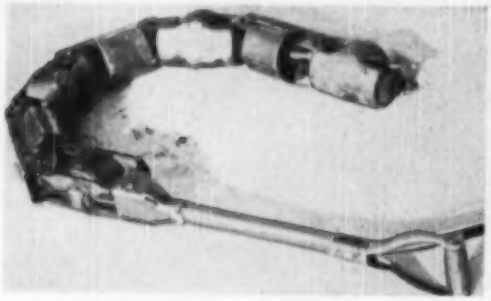
Mack Trucks, Inc., Empire State Building, New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Long Island City, N. Y. Factory branches and distributors in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.



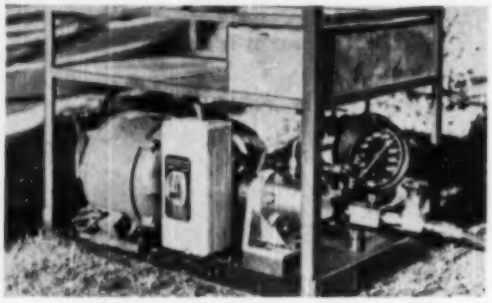
CLOSED—New coal breaker ready for a 5-in hole.




OPEN—Jacks expand in 30 sec, in order shown.



FLEXIBILITY features the patented device.



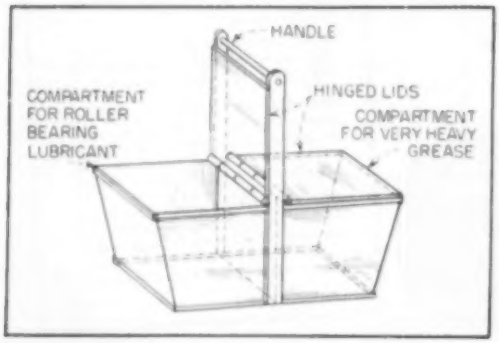
POWER UNIT supplies up to 10,000 psi.

## Jacks Used in Hydraulic Coal Breaker

A HYDRAULIC COAL-BREAKING DEVICE using jacks has been patented by Robert Johnson, Box 174, Lafayette, Colo., who writes that he is a veteran of more than 30 yr in coal mining. The unit, he declares, is especially useful for duckbill work in either high or low coal where the bottom is loaded out before the top is shot, and he expects to adapt it to breaking down an entire face prior to loading by machine. "All the bugs" have been eliminated, he reports, in 7 to 8 yr of development.

The big improvement in the breaker is the manner in which it breaks the coal, according to Mr. Johnson. As shown above with the jacks closed, the breaker is ready to be inserted in a 5-in drill hole. Expansion of the jacks requires about 30 sec, the No. 1 jack breaking the coal first and the others following in sequence, as numbered in the top right photo. The result is coal broken small enough to be handled by machine. When the pump pressure is released, the rubber retractors close the jacks and the unit is ready for the next hole. The entire breaker weighs about 50 lb. The jacks are set on 16-in centers and have an over-all area of 9.6 sq in. Four jacks will handle a 6½-ft. cut, Mr. Johnson writes.

The power unit, as illustrated, consists of a 3-hp 1,750-rpm motor, a hydraulic oil pump offering a maximum pressure of 10,000 psi, an oil filter, and a relief valve set at 8,000 psi. From 2,500 to 6,000 lb of pressure usually breaks the coal, experience has demonstrated.




## Twin Lubricant Container Speeds Truck Servicing

THIS LUBRICANT CONTAINER described in a recent issue of *Engineering and Mining Journal* will prove a helpful addition to the lubricating equipment available at any mine shop servicing trucks. Modern practice in repacking truck wheels calls for an extra-heavy grease to fill the wheel hub and a lighter lubricant for use on roller bearings. To expedite the work and avoid carrying around two separate containers, this unit divided into compartments for the two different lubricants is suggested. Hinged lids protect the lubricants from dirt and other foreign material. The two-compartment unit can be made cheaply from scrap materials available at any mine shop.

# It's easy to use O-B ROOF SUPPORT EXPANSION SHELLS AND PLUGS

## CONVENIENCE

Proper pre-expansion is established at the factory when the shell is driven onto the plug. This also assembles the shell and plug into an easy-to-handle unit to be turned onto the bolt later at the mine.

## SPEED

See how you can do a good job—swiftly! With a few turns of the wrist and a sharp rap on the bottom, the plug is on the bolt and the shell rests on its support (Palnut, upset ear, etc.) ready to go up into the hole. (Rapping the bolt head on the floor separates the shell from the plug. Then the shell prongs are free to spring in to conform with the hole diameter).

● O-B Roof Support Expansion Shells and Plugs provide an easy way for rapid and secure roof bolting, because they're especially designed for the job. If you are bolting to keep your roof in tip-top shape, you'll want to know how O-B Roof Support Expansion Shells and Plugs measure up for convenience, speed and dependability.

## DEPENDABILITY

Of course you want good roof! If you are using bolting to get it, remember this about O-B Expansion Shells and Plugs:

Properly installed in right-size holes, O-B Expansion Shells and Plugs will develop the full tensile strength of the bolt.

● ● ●

You can get more information on roof bolting. O-B field tests and observations, as well as clear illustrations of bolting procedure, are printed in our Bulletin No. 864-M. Use the coupon to get your copy.

OHIO BRASS COMPANY
Mansfield, Ohio
Please send me a copy of Bulletin No. 864-M.

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MANSFIELD OHIO, U. S. A.

CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

HAULAGE WAYS

*Gain up-to-the-minute*

# O-B TYPE-T SECTION

- *Fused Magnetic Blowout*
- *Double Airgap Protection*
- *Even Power Flow to Motor*
- *Energized Center Runner*
- *Wire-Smooth Collector Path*

HERE'S a combination of wire-saving design features that prevent pit-forming arcs as the current collector passes through the section insulator. The wire path is interrupted in two places to provide double airgap protection between sections. However, the center runner is energized through a fuse with magnetic blowout, and under all normal conditions the energized center runner prevents arcing as the shoe goes through the insulator. In addition, there is an even flow of power to the locomotive; there are no "dead spots" in the wire path to cause motor surging.

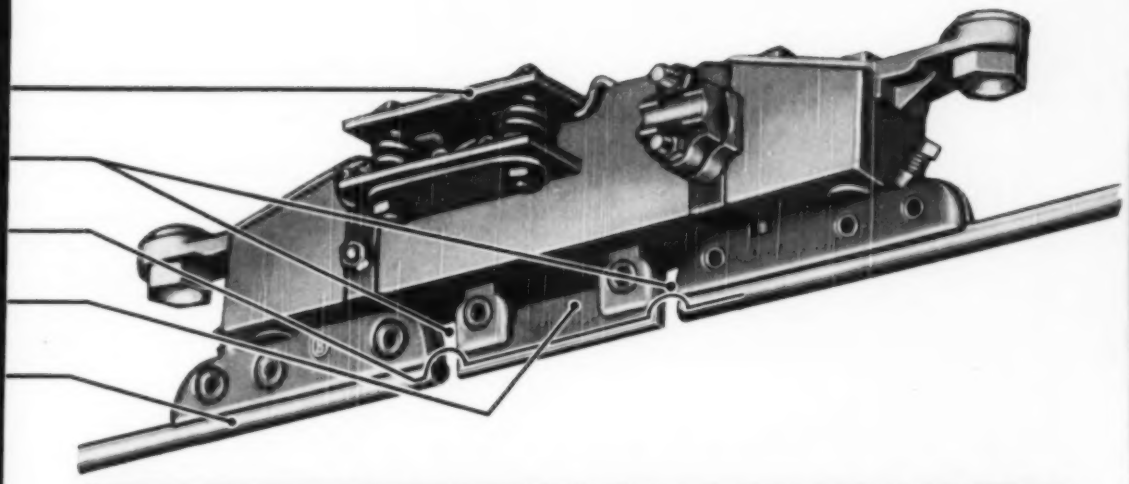
The fuse carrying current to the center runner is adequate for all normal locomotive operating loads. However, it is not heavy enough to carry the sudden increase in current if the collector passes the center runner to enter a grounded section. Thus, if a grounded section is entered, the increased current will burn out the fuse before any vicious wire-burning arc can be established between the center runner and the leaving wire.

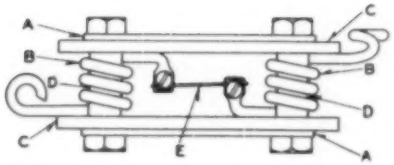
Blowing the fuse link does create an arc, however, which is made harmless by the magnetic blowout principle. The wire coils in the magnetic fuse are wound so as to establish an electromagnetic field that blows the arc out and away from the wooden switch body.

For catalog reference, the Type-T Section Insulator with Magnetic Fuse, No. 27416 (without Magnetic Fuse, No. 27417), is shown on page 64 of your O-B Mining Catalog No. 27. Your O-B representative will show you how easily you can fit the Type-T Section Insulator into your present overhead system. Ask him about it!

*advantages for your overhead system*

# INSULATOR PROVIDES...






The magnetic fuse consists of two metal plates (A) faced by insulation (C). Current passing through the wire coils (B) around the insulated bolt sleeves (D) creates a magnetic field between the two plates. Current is carried from the trolley to the center runner through a small copper wire (E) which serves as a fuse.

The arc formed when the wire fuse blows is forced outward away from the beam and extinguished by magnetic blowout.

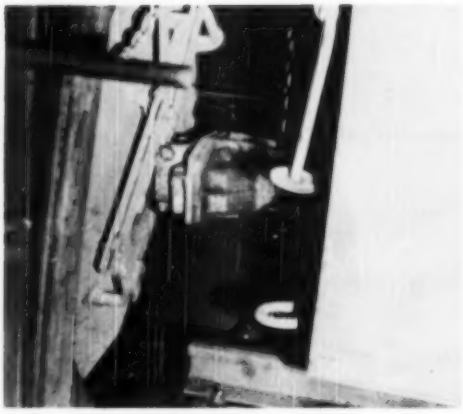
**Ohio Brass**

MANSFIELD OHIO, U. S. A.

CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

HAULAGE WAYS

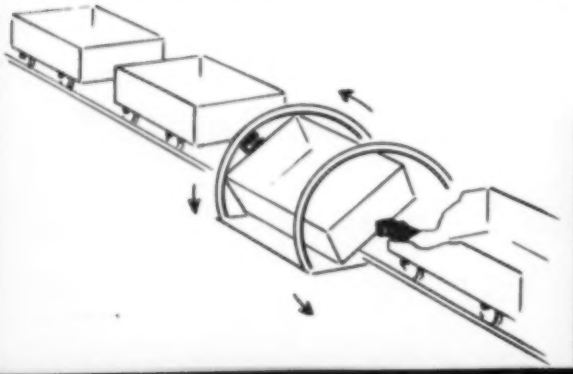
# Dump 'em QUICKER, CLEANER!



## O-B Couplers Speed Mine Cars Through Your Rotary Dump

As the car rolls over, the coal falls out—and another load of black diamonds is on the road to the tipple and the ultimate consumer. Although hidden by the trip of cars in one view, the other close-up shows the tilted car revolving about the shank of the male head of an O-B Automatic Coupler.

O-B Automatic Couplers can be provided with a rotating male shank. This rotary coupler adds considerably to the efficiency of any rotary dump operation, enabling the cars to turn over while still coupled in the trip. Since only the male head rotates, the couplers always return to their normal horizontal position. The minutes saved by eliminating unneeded coupling and uncoupling can add up to hours in a very short time—cutting your labor cost and thereby paring the all-important "cost per ton."

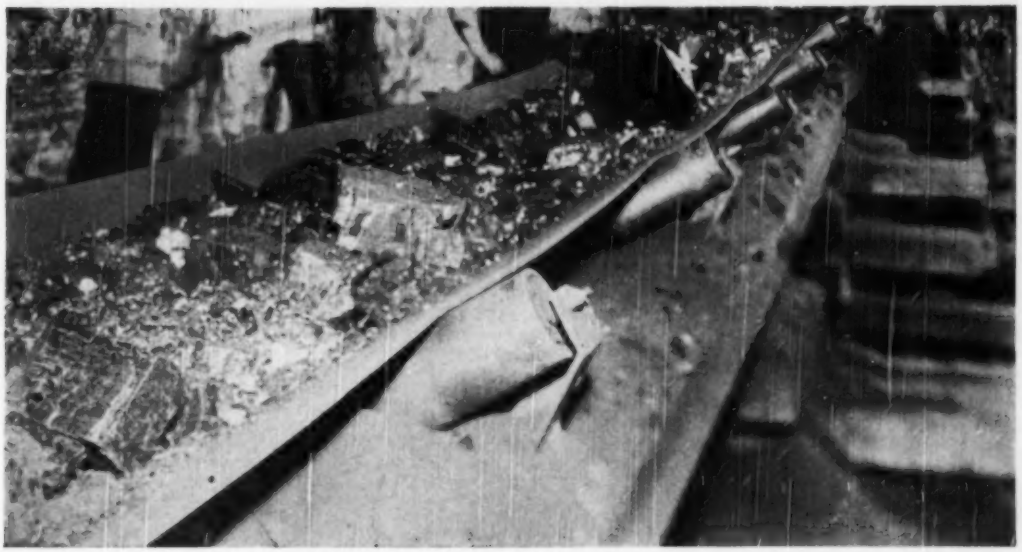


Ohio Brass

MANSFIELD OHIO, U. S. A.

CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

# NEW 4-PLY UNDERGROUND COAL BELT HAS RUGGED STRENGTH AND GREATER FLEXIBILITY



Here's the remarkable new 4-ply U. S. Giant Underground Coal Belt that's every bit as rugged as United States Rubber's 4-ply 42 oz., but with greater crosswise flexibility.

This belt is available in two styles:

*Style XN* has a working tension strong enough to handle all known belt requirements except extremely long center installations.

*Style YN* incorporates the additional strength required by extremely long center installations in use or planned.

Outstanding features of this remarkable belt include: OPTIMUM CROSSWISE FLEXIBILITY, providing excellent troughing and easy training, eliminating edge wear and spillage. CROSSWISE STRENGTH, to resist gouging and tearing. ONE TYPE FABRIC CONSTRUCTION, to equalize tension and elongation throughout the belt. ELASTICITY, to cushion shock loads and impact, prevent localized strain. FASTENER HOLDING STRENGTH comparable to United States Rubber Company's 4-ply 42 oz., which hitherto has been considered outstanding in this respect. HIGH STRENGTH AT LESS WEIGHT facilitates transportation of belt in underground locations.

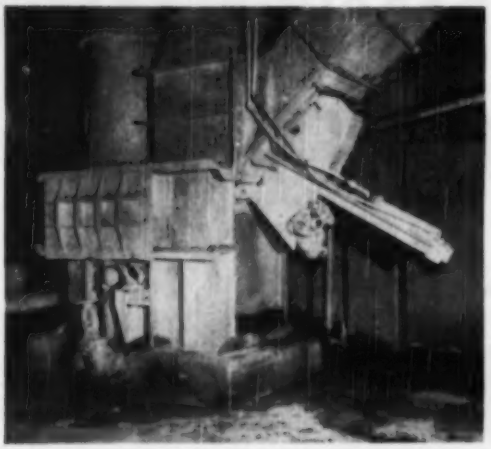
For more information write Mechanical Goods Division, United States Rubber Company, Rockefeller Center, New York 20, N. Y.

A PRODUCT OF

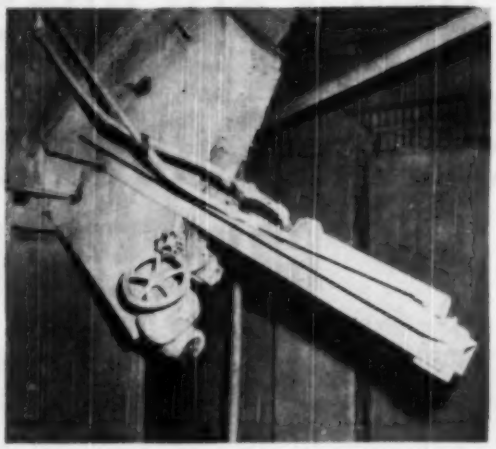
U.S.RUBBER
SERVING THROUGH SCIENCE

**UNITED STATES RUBBER COMPANY**

**Rockefeller Center, New York 20, N. Y.**



TIME CONSUMING CLOGGING of cone refuse is prevented by operating this remotely controlled air-actuated ram attached to the chute leading to the elevator boot.



TO STIR UP the clogged slate a ¾-in knife is forced through a slot in the chute by an air cylinder operating through a packing gland in the side of the watertight steel box.

## Air-Operated Ram Instantly Clears Refuse Clogging

MANIPULATION of an air valve at the Chance-cone control board clears in a few seconds a difficulty which formerly caused shutdowns of as much as 1½ hr at the central preparation plant of the Consolidation Coal Co. (Ky.), Div. of Pittsburgh Consolidation Coal Co., Jenkins, Ky.

Slate up to 10-in in size from one of the Chance cones sometimes clogged at a point where the material converged from a closed chute 24 in wide to enter the 16-in boot of the refuse elevator. The new power device that quickly clears any clogging is an air-operated ram consisting of a ¾-in steel plate operating through a slot in the bottom of the chute. Normally, the top edge of the ram or plate lies level with the bottom wearing surface of the chute.

The plate is enclosed in a watertight steel box attached to the bottom of the chute and the piston of the air cylinder operates through a packing gland on the side of the box.

Although there is only slight clearance between the ram plate and the sides of the slot, very fine material works through and would eventually fill the ram box. To flush out the box, a 4-in opening with a gate-valve taps the lowest point. Above it is a 1-in connection with another gate valve for use of a hose if that becomes necessary.

The cone operator can see the refuse dewatering and desanding screen from the control station. If, during normal operation, material stops flowing onto the screen, he knows that clogging is taking place and manipulates the valve to "goose" the ram a few times and start the material moving.

The idea of this sealed-in and remotely controlled ram was conceived by Robert L. Blake, superintendent of the plant.

## Special Truck Built for Outside Electrical Crew

EQUIPPED WITH COMPLETE ELECTRICAL POLE-LINE EQUIPMENT, this truck is used by the outside electrical crew at the Eastern Ohio operations of the Lorain Coal & Dock Co., under the supervision of Stanton Keller, chief electrician, who is shown in the cab, according to the *Lorain-Lorado Journal*. The 1½-ton heavy-duty truck has eight forward speeds and two reverse. It is equipped with a 25,000-lb-working-capacity winch and a 26-ft A-frame derrick. The special unit was built by M. E. Schell, master mechanic, Blaine mine, and his crew, assisted by Mr. Keller.

(Partial view of the enormous new lubricating oil plant at Lake Charles, La., where this great new oil is processed.)

# "ANTI-FOULING" OIL made by the Remarkable new "HEART-CUT" PROCESS

**This new oil—the best known to science... gives you a cleaner engine... more economy ...minimum carbon residue.**

It's here now! The remarkable motor oil from the giant new $42,000,000 lubricating oil plant at Lake Charles, La. The plant that's been the big talk of the oil industry for months.

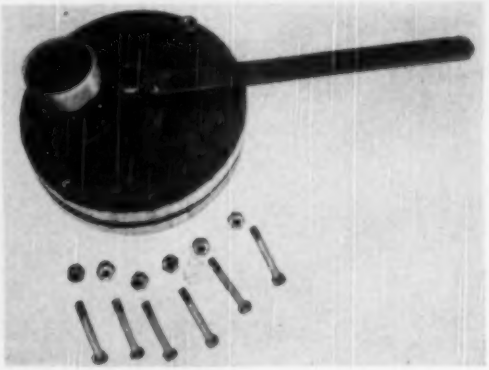
New Premium Koolmotor is made by the unique "Heart-Cut" Process which retains only the choicest part of the finest crudes. *It's so superior that in recent engine tests it outscored nine other major premium motor oils.* No wonder Premium Koolmotor is better in every way! Cleans better, seals better, cools better and fights acid, sludge and corrosion far more effectively. Switch to this remarkable new oil today.

*start saving Dollars today... stop at*

**CITIES SERVICE**

# New-Type Orifice Valves Improve Washing-Plant Performance

THIS ORIFICE VALVE is typical of the many that have improved efficiency and reduced maintenance in Consol (Ky.) plant.



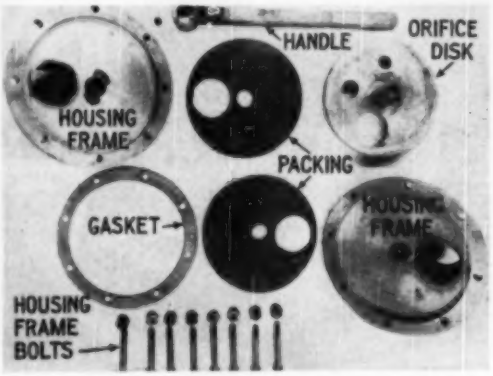
PARTIALLY ASSEMBLED—Bolts are tightened only enough to compress the rubber gasket and packing disks to prevent leakage.

REPLACEMENT of gate valves in water lines handling solids with orifice valves of a new type has resulted in a more efficient job of coal cleaning at the central preparation plant of the Consolidation Coal Co. (Ky.), div. of Pittsburgh Consolidation Coal Co., Jenkins, Ky. In addition to providing a more uniform control, which raised efficiency, the valves eliminated the leaks common with gate valves worn by solids. Moreover, the new valves require little or no attention and last many times longer than a gate valve.

This improved orifice valve, developed in "self-defense" by R. L. Blake, preparation-plant superintendent, has a distinct advantage over the older types and patents covering the new feature have been applied for. Essentially, the new feature consists of rubber-disk seals which completely fill all voids in the valve and confine the water and solids to the ports.

The orifice disk, as shown in the illustrations, is clamped between the two rubber packing disks, which are held in place by very short nipples on the inside of the housings. The housing gasket is a soft rubber which can be greatly compressed by the housing bolts. They are tightened to provide only sufficient pressure between the orifice disk and packing disks to prevent leakage when the valve is closed.

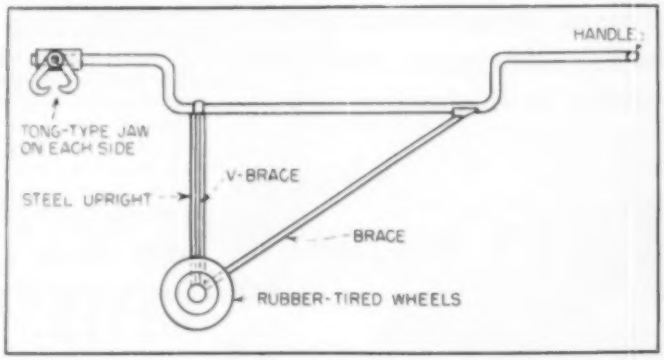
The Jenkins plant operates three shifts, has handled 13,000 to 14,000 tons of raw feed a day and has shipped 10,000 tons of washed coal (*Coal Age*, August, 1949). By preventing an accumulation of fines which affected washing gravity, the new valves improved results from the Chance cone which washes the 1 x 3/16-in coal.




EXPLODED VIEW of the new-type orifice valve, in which there are no voids to accumulate solids.

## Handy Shop Dolly Has Many Uses

CAR AND TRUCK WHEELS, motor armatures and other equipment can be handled easily and quickly with this simple dolly illustrated in a recent issue of *Engineering & Mining Journal*. It consists of two wheels mounted on an axle, a steel upright or post with a steel V-brace, a steel boom unit supporting tong-type jaws on the front end for lifting and a steel handle at the rear end. The assembly is about 5½ ft long and 32 in high, with an 8-in offset in the center to clear the skirt and underframe of a car.



# PARIS MANUFACTURING COMPANY

## *Announces*

# THREE *NEW* DRILLS

The PARMANCO Coal Drill will drill 2⅝ inch holes at a speed of up to six feet per minute in #5 coal. Equipped with heavy duty truck-type transmission and rear end and a complete hydraulic feed, the drill is operated by one man from the control seat. It is made in two sizes with a 12 h.p. or 25 h.p. gas motor and all units are completely self-contained and enclosed in oil-tight cases.

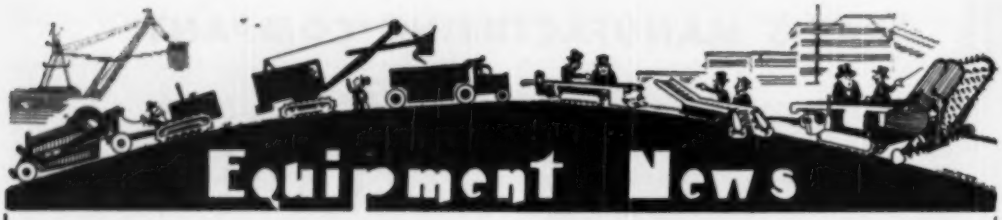
***ALREADY USED by***

| | |
|---|---|
| United Electric Coal Companies 6 | Knox Coal Mining Co..... 1 |
| Ayrshire Collieries Corp..... 2 | Huntsville Sinclair Mining Co. 4 |
| Big Bend Collieries, Inc..... 1 | Truax-Traer Coal Company.... 1 |
| Little Sister Coal Corp..... 1 | |

***THIS UNIT IS DELIVERING 6-INCH SHOT HOLES — READY FOR LOADING at Better Than a Foot a Minute ! ! !***

The new PARMANCO Hi-Speed Horizontal Drill is completely redesigned around a 40 h.p. engine with four drilling speeds which, in field tests, has cut one-third off the footage drilling time —a cost-per-drilling-foot saving that we are passing on to the strip mine operator and contractor at no increase in our price. In addition the drill is equipped with a starter and generator, dual type front wheels, truck type rear axle with mechanical brakes and a traction drive with both forward and reverse.

PARIS MANUFACTURING COMPANY
Paris, Illinois

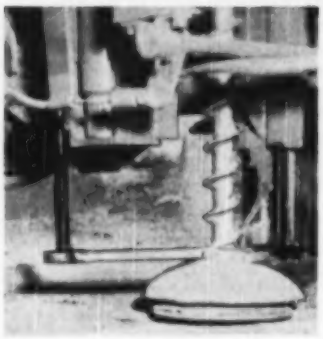


# Equipment News

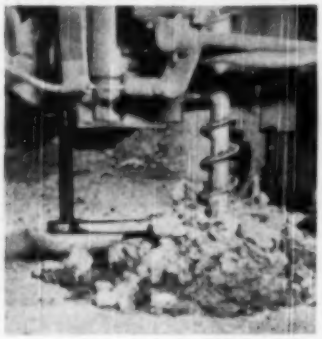
## New Equipment for Better Mining and Preparation . . . p 106 to p 126


Car Spotter
Core Drill
Drill-Cuttings Shield
Excavators
Elevator Backstop
Flexible Coupling
Load Binder-Jack
Overhead Hoist
Plastic Pipe
Protective Coatings
Protective Linings
Scraper
Sheave Line
Speed Reducer
V-Belts
Vibrating Screen
Water Spray
Winch
EQUIPMENT SHORTS AND PUBLICATIONS


## Automatic Drill Shield Keeps Hole Free of Cuttings

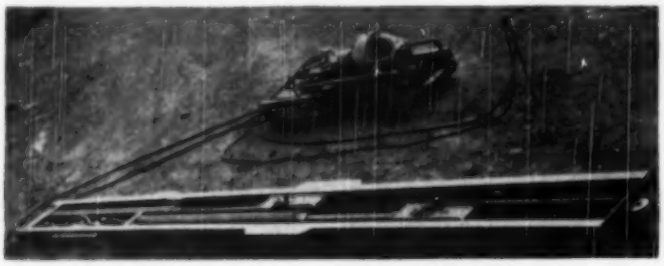


NEWLY ANNOUNCED drill shield and guide on Parmanco self-propelled coal drills . . .



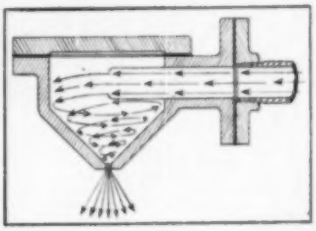
OPERATES EFFECTIVELY to keep blast holes clear of cuttings and . . .

FORMS DAM around hole that excludes casual surface water.—Paris Mfg. Co., Paris, Ill.



### Hydraulically-Powered Car Spotter

New Stamler hydraulically-powered barney-type car spotter is said by the manufacturer to offer ease of installation, ready movability, low first cost and minimum maintenance, positive protection against overloads and the advantage of a separate power unit placed out of the way. The unit consists of two barney-type cylinder assemblies each moving slightly more than one-half a car length and coordinated to move a car ahead in a continuous, controlled movement. It may easily be made permissible and the simplified design permits operations under conditions of misalignment often found in such installations, the company says. The unit is controlled by a pilot valve connected to the main-system relief valve and is available in ratings of 5, 10 and 15 hp, with maximum thrusts of 8,000, 14,000 and 20,000 lb, respectively; a stroke up to 25 ft, as necessary, and a changeable speed of 40 fpm. The power unit is connected to the track unit by two flexible hoses equipped with self-sealing couplings that permit uncoupling without loss of oil.—*W. R. Stamler Co., Paris, Ky.*



### Water Spray

New Cyclo-Spray, designed for use on stationary, shaking, vibrating and revolving equipment to remove sticky impurities, is said by the manufacturer to have no interior parts, vanes or deflecting plates and to require less water than standard sprays, with much greater aspersion. The Cyclo-Spray can be used with either clean or dirty water and digs down throughout a bed of material, for efficient results, the company says. After passing through the nozzle body under moderate pressure, water develops a cyclonic action.—*Pyramid Screen Co., 30 Church St., New York 7.*

## New Bit Rotary Drills Bolt Holes in Medium Hard Roof . . .

### Savings of Thousands Of Dollars Predicted

Development of a rotary bit for rock and laminated sandstone has been announced. The bit (FD Series) is used in coal drills.

Commenting on the bit, Curtis F. Rivers, Gen. Supt., Tennessee Product and Chemical Corp., Whitwell, Tennessee, predicted that it would save coal operators thousands of dollars. A Kennametal cemented carbide cutting edge resists shock and impact, and its shape makes it ideal for starting.

The operation shows the bit being powered by a Jeffrey A-7 Drill. A special alloy steel drill rod is used.

Write for Bulletin M-105. **Kennametal Inc., Latrobe, Pa.**

•

## 30% Less Power Required To Cut Coal, Reports Claude Matthews, Supt., Moore Coal Co.

Tests made by a West Virginia engineering concern show that Kennametal U-5-H Machine Bits consume 30 per cent less power than conventional steel bits. The power comparison was made at the Moore Coal Company.

Mr. Claude Matthews, Supt., said that an Esterline Angus watt-hour meter showed that steel bits placed 105% of rated load on the motor and that Kennametal bits required only 75% of rated load. The horsepower consumption was 52 against 37.

Write for Bulletin M-115. **Kennametal Inc., Latrobe, Pa.**

•

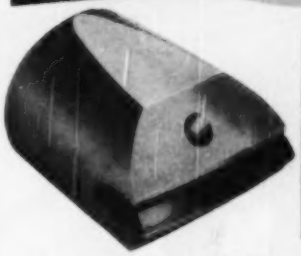
## Bit Developed for Shale, Slate, and Boney Roof Drilling

A special bit for rotary drilling roof bolt holes in shale, slate, and boney has been developed. The bit, (RD Series) is a modification of the conventional coal bit. It is stubbier and stronger.

Write for Bulletin M-105. **Kennametal Inc., Latrobe, Pa.**

# Drill Sandstone

## Better, at Less Cost—with Kennametal Rock Bits



**Operators get up to 75% faster drilling, over 100 times longer bit life. *Examples are:***

| LOCATION | | FOOTAGE | | Ratio of Bit Life | % Increase in Speed |
|---|---|---|---|---|---|
| County | State | Steel | Kennametal | | |
| Cambria | Pa. | 1.1' | 198' | 180 to 1 | 75% |
| Monongalia | W. Va. | 8.0' | 1336' | 167 to 1 | 33% |
| Westmoreland | Pa. | 1.5' | 294' | 212 to 1 | 42% |
| Raleigh | W. Va. | 6.8' | 1305' | 192 to 1 | 46% |
| Average life and speed increases on these four typical operations: | | | → | 188 to 1 | 49% |

You get better bolt holes with Kennametal cemented carbide rock bits, because hole gage is uniform—the whole length. Bolts have better anchorage and make safer, more secure jobs. Drilling speeds are increased because Kennametal cemented hard carbide rock bits have high resistance to wear, stay sharp and on the job far longer.

Performance clearly shows that first cost is of slight consideration and that bit cost is from 50 per cent to 20 per cent less under average drilling conditions. In addition to lower bit cost consider other advantages such as speed, handling time and bit changing.

Your Kennametal representative is an experienced mining man—ready to demonstrate to you how Kennametal rock bits can give you savings that are really outstanding. Contact him or write—Mining Division, Kennametal Inc., Latrobe, Pa.

# KENNAMETAL®

**DRILL BITS • MACHINE BITS • STRIP BITS • ROCK BITS**

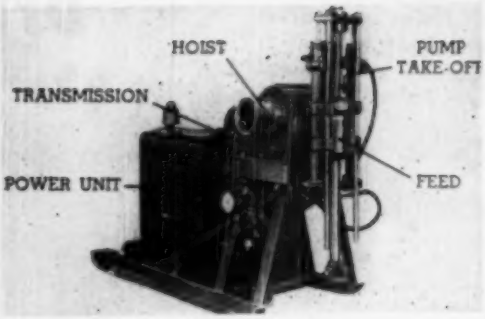
*Write us for any information you want on Cutting or Drilling*

ADVERTISEMENT

## EQUIPMENT NEWS

### Three-Section Vibrating Screen

Tri-Slope single-deck screen, a new addition to the Ripl-Flo screen line, is designed for especially fine screening and has a single deck divided into three sections, each with a slope 5 deg less than the preceding one. The result is a high rate of travel to rapidly stratify the material at the feed end and a reduced rate as the material travels toward the discharge end, thus maintaining proper bed depth at each point, according to the manufacturer. The unit also is equipped with a Sta-Kleen feature for handling moist material, which consists of specially shaped rubber balls that bounce between the screen surface and a deck below to jar small damp particles loose from the screen. Bulletin C-7 available.—*Allis-Chalmers Mfg. Co., Milwaukee, Wis.*

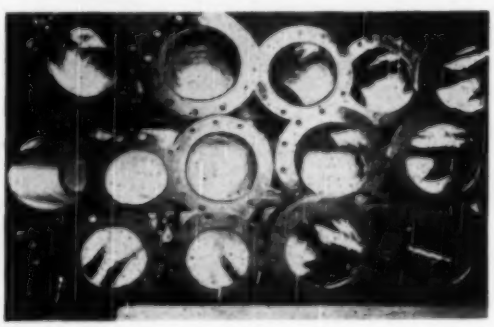



### High-Speed Core Drill

New Acker "Teredo" core drill, designed as a light, compact portable unit of medium capacity for depths to 600 ft, basically consists of a three-speed totally enclosed transmission with either a hydraulic-feed or screw-feed drill head. The hydraulic feed is said to provide sensitive and instantaneous control of the rate of advance and pressure on the bit, while the screw-feed drill is somewhat lighter and lower in cost. Other features cited include full 24-in drill travel for more footage per shift, a hinged gatehead that swings clear of the hole without moving the entire rig and a drill head that rotates a full 360 deg. Optional power plants are available and a power take-off drives an integrally mounted positive-displacement pump. Bulletin 30 available.—*Acker Drill Co., Inc., Scranton, Pa.*

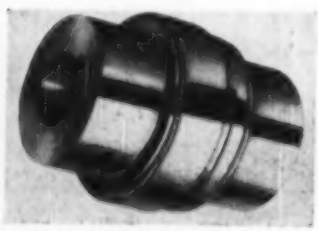
### Semi-Rigid Plastic Pipe

Unusually light in weight, Carlon T semi-rigid plastic pipe reportedly can be laid more rapidly and economically than conventional pipe and is guaranteed against rot, rust and electrolytic corrosion. It reportedly is not damaged by freezing water and can be laid above the frost level, also being recommended by the maker for high-voltage conduit. It is furnished in 20-ft lengths, in ½- to 2-in sizes, and a 20-ft section of 2-in pipe is said to weigh 9 lb.—*Carter Products Corp., 10223 Meech Ave., Cleveland 5, Ohio.*



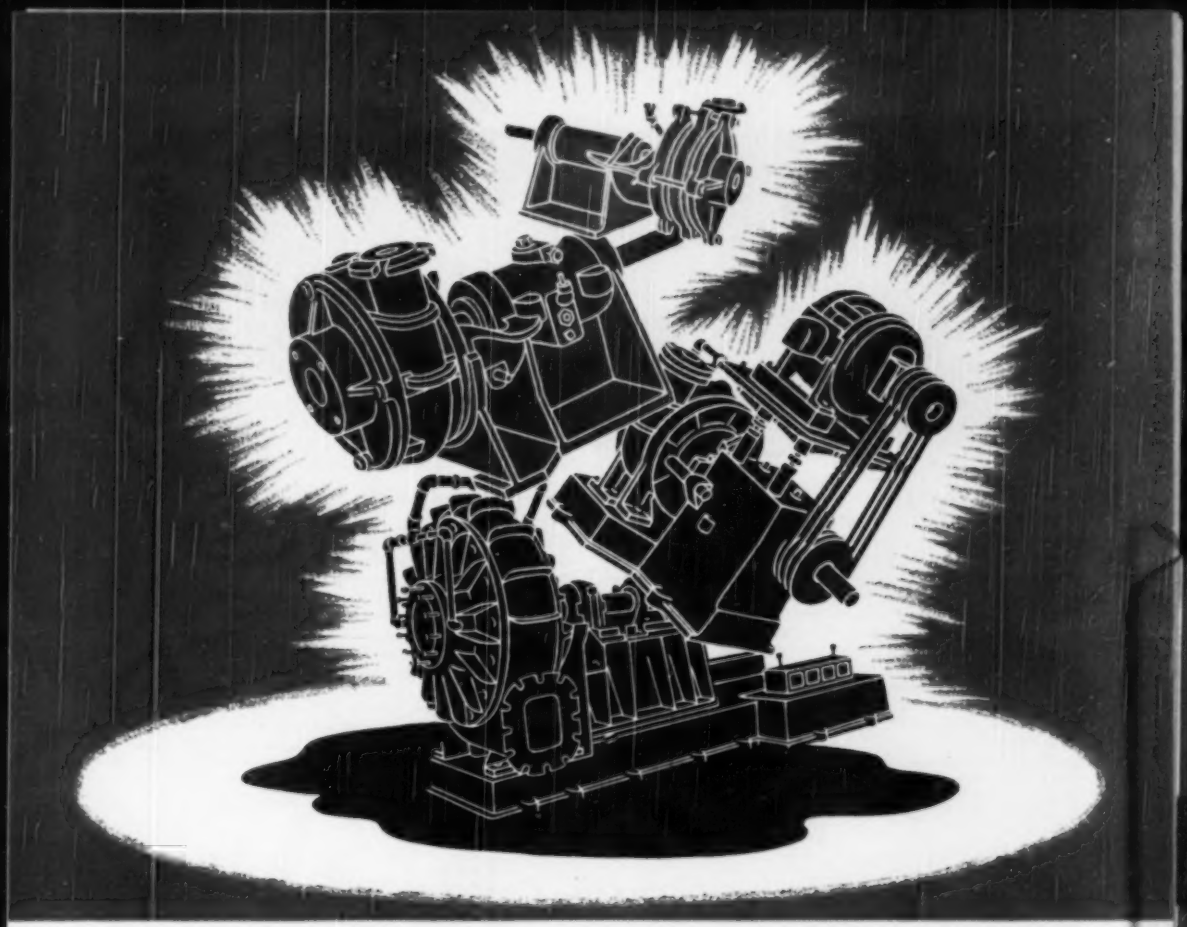
### Protective Lining and Coating

Application of Lithcote, a baked-on phenol-formaldehyde synthetic-resin coating, on a wide range of metal equipment, including the water pipe shown above, is said by the manufacturer to prevent corrosion and contamination. Used as either a lining or coating, Lithcote is sprayed on and then bonded by a special baking process to provide a surface that is reported to be inert to acids, solvents, brines, petroleum, etc., over a wide range of temperatures. Bulletin available.—*Lithgow Corp., 36 W. 44th St., New York 18.*



### Flexible Coupling

Extra ease of installation and larger bore capacities are features of the improved Lovejoy L-R Type C and H couplings, designed for use on motor-driven or engine-driven machinery of 50 to 1,000 hp. The inside sleeve is made in two parts, providing a sleeve in each body, and both bodies are machined alike for the removable steel collar, which permits putting the collar on either half of the coupling. The collar is held in place by snap-ring. As with all Lovejoy couplings, these new models are said to instantly adjust for misalignment, shock, vibration, oscillation, surge or backlash. Catalog available.—*Lovejoy Flexible Coupling Co., 5001 W. Lake St., Chicago 44.*



# THE 12 PLUS-VALUES

## IN ABRASIVE MATERIALS PUMPING

Yes, for handling almost any kind of abrasive materials, you get many extra-values in Hydroseal because it's a pump that's designed especially to solve special problems. Look over this list and see how many of these features meet your requirements.

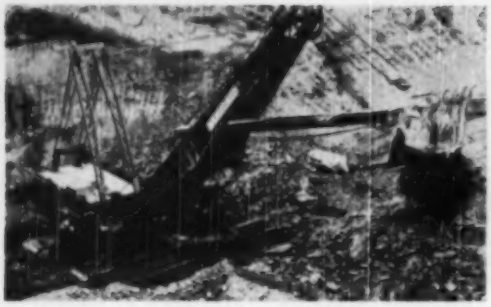
After you've read them, you'll want to write for more information about Hydroseals. Better still, tell us what your pumping problem is, and we can recommend the system and kind of Hydroseal that can do your job. The Allen-Sherman-Hoff Co., 231 S. 15th Street, Philadelphia 2, Pa., U. S. A. Representatives in Most Principal Cities.

1—Wide range of sizes (10 g. p. m. to 12,000 g. p. m.)
2—Saves ⅓ to ½ in power costs
3—Handles filtrate or finest slurries at heavy concentration, up to 6" boulders
4—Abrasives bounce off Maximix Rubber parts
5—2 in 1 drive design
6—All-weather pump—hot, cold, wet or dry
7—Maximix Rubber outlasts equivalent metal parts 4 to 6 times
8—Discharge can be vertical, horizontal, right or left
9—Easy changeover for handling different materials or changing volume
10—Lowest cost materials handling method
11—Low cost maintenance
12—Hydroseals are part of a "pumping system" engineered specifically for your requirements

# HYDROSEAL

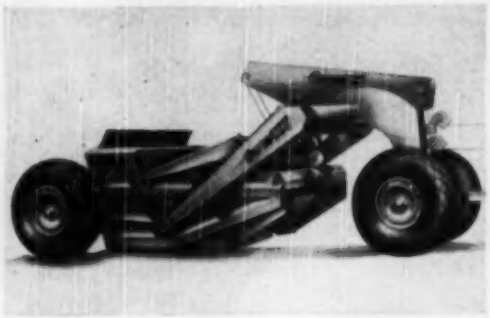
SAND, SLURRY & DREDGE PUMPS
MAXIMIX RUBBER PROTECTED

HYDROSEAL PACKLESS AND MAXIMIX DESIGNS ARE COVERED BY PATENTS AND APPLICATIONS IN THE MAJOR MINING CENTERS OF THE WORLD



## 5½-Yd Excavator

New Manitowoc Model 4500 5¼-yd unit, available as a shovel, dragline or crane, is said to be particularly applicable to coal stripping and loading. Hi-lift shovel booms are offered in lengths of 60 ft, with 45-ft stick and 4-yd dipper, and 50 ft, with 37-ft stick and 5-yd dipper. The standard shovel has a 38½-ft boom, 27-ft stick and 5½-yd heavy-duty rock dipper or larger coal-loading dipper. Dragline booms range from 100 to 140 ft, with the upper two-thirds made of aluminum alloy, and carry a 4-5-yd bucket. Features cited by the manufacturer include straight diesel power; air control of clutches and brakes; elevated operator's cab; two-part cable crowd; 40-in shoe-type swing clutches individually applied by air pressure; and single tubular dipper stick. Catalog 45-50 available.—*Manitowoc Engineering Works, Manitowoc, Wis.*

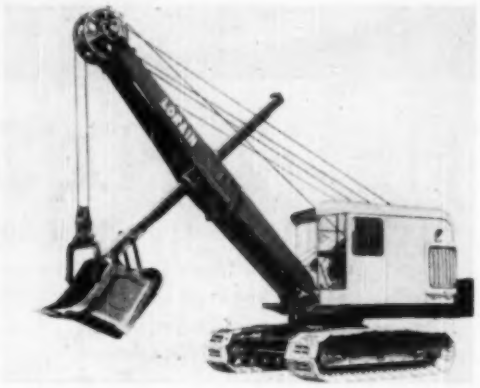


## Cable-Operated Scraper

Gar Wood Model 625 four-wheel open-bowl cable-operated scraper, especially designed for use with Allis-Chalmers HD-19 tractor, has a capacity of 24.5 cu yd, heaped, and 19.2 yd, struck. According to the manufacturer, positive forced ejection is accomplished by a sliding end gate, which moves forward to positively eject all material in the bowl and is returned to the digging position by heavy-duty springs. End and center sections of the bowed three-piece cutting edge are reversible for maximum economy, and easy loading with a live boiling action results from the design of the cutting-edge pitch and bowl and apron proportions, it is said. High ground clearance, greater stability and ease of maintenance are other design features cited. Three separate tire combinations are available.—*Findlay Div., Gar Wood Industries, Inc., Findlay, Ohio.*

## Excavator

New Marion Type 43-M 1-yd unit may be readily changed in the field to serve as a shovel, dragline, clamshell, crane, backhoe or piledriver. Design of the machine permits front-end changeovers without the need for machinery, lagging or sprocket changes. A single boom serves both shovel and backhoe jobs, with another boom used for dragline, clamshell, crane or piledriver service. Other 43-M features cited are: simply-designed and easily-accessible machinery; ball or roller bearings at 22 critical friction points; grouped lubrication fittings at accessible points; independent chain crowd and independent boom hoist with overrunning clutch; and self-cleaning non-clogging crawlers, shielded from dirt. Design of machinery supports assures permanent machinery alignment, it is said. Bulletin 400 available.—*Marion Power Shovel Co., Marion, Ohio.*



## Shovel-Crane

New Lorain-50, a 1-yd power shovel-crane, is said to be the first machine in this class equipped with a hydraulic coupling as standard equipment. Power take-off on the Lorain-50 is through a twin-disk hydraulic coupling that prevents stalling the engine because of digging conditions and that also absorbs digging stresses and strains before they can be transferred to the operating mechanism and cables. The standard power plant is a 6-cylinder diesel engine, with a 6-cylinder gasoline engine optional. Turntable rollers, mounted on Timken roller bearings, are of a special design in which the roller itself serves as the outer race for the roller bearing. Interchangeable boom equipment permits the unit to be converted for use in shovel-crane-piledriver applications and four different crawler mountings are offered.—*Thew Shovel Co., Lorain, Ohio.*

## 7 Reasons why these YELLOW JACKET Cables mean Safety!

Trailing Cables have to be tough to withstand the flexing and twisting they must take while reeling in and out.

Seven grueling laboratory tests, all of them tougher than actual conditions, guarantee U. S. Royal's resistance to abrasion, cutting, heat, moisture, cold, impact—and its ability to stand constant flexing. The bright yellow color gives U. S. Royal Gold the highest visibility. To get your copy of the new U. S. Royal Gold descriptive folder write Electrical Wire and Cable Department, U. S. Rubber Company, Rockefeller Center, New York 20, N. Y.

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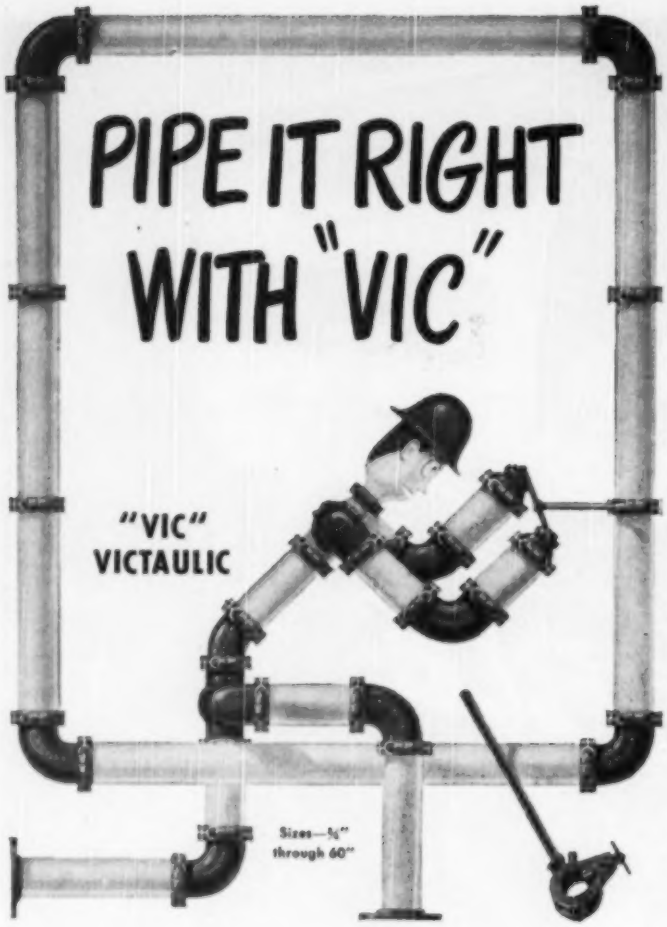


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The Victaulic Way makes fitting those pipe ends easy..."Vic-Groover" grooves 'em automatically in half the time of a conventional pipe threader!

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The easiest way to make ends meet
VICTAULIC
PIPE COUPLINGS AND FITTINGS

## Winch

New Atlas-Fridy Model 60 heavy-duty slow-speed winch is said to be especially adaptable to coal-field loading and railroad-car spotting, offering up to 60,000-lb load pull at a line speed of approximately 40 fpm. Features cited include modification of line speed, all-steel construction, hardened steel jaw clutch, self-energizing brake and a fluid coupling to absorb shock and pick up loads smoothly.—*Atlas Corp., Mountville, Pa.*

## V-Belt Improved

New "high-capacity" multiple V-belt offers a 40% increase in horsepower rating over comparable sizes of standard V-belts used for this service and also is available for use where dissipation of static is essential, according to the manufacturer. The increased capacity has been effected without stiffening the belt construction or reducing safety factors inherent in the standard types, the company reports.—*B. F. Goodrich Co., Akron, Ohio.*

## Protective Coating

Bisonite "M" is an easily applied and economical coating for metal, wood or concrete surfaces that is resistant and non-contaminating to acids, salts, alkalis and certain solvents, according to the manufacturer. The product has been successfully used over a 7-yr period in a wide range of applications, such as tank linings, fumes handling, structural steel and pipe and gasket material, the company reports. It also is said to be an effective concrete-waterproofing material, and to be flame-, light- and abrasion-resistant, flexible and non-porous, and when cured, to form a smooth high-tensile-strength dialectric surface. Detailed data sheet available. —*Bisonite Co., Inc., Buffalo 1, N. Y.*

## Load Binder and Puller-Jack

One man can quickly and safely handle difficult moving jobs and load binding with the new Nolan load binder and puller-jack that can be quickly set up and used in any position—upright, sideways or upside down—with lever pull away from load or toward it, the manufacturer reports. The mechanism will not clog with dirt and gives positive action, and the unit is the only puller that pulls for the entire chain length at

# *This is the* COLMOL Breaker Bit

## that *goes into the breaker head*
## that *does the breaking*
## that *slashes mining costs*

This Bit is the result of several years of intensive experimenting and breaking of coal . . . no expense spared to perfect a Breaker Tooth capable of freeing the coal from the face. Rugged construction—inherent toughness built in. Entire set of bits may be replaced in less than four minutes.

EASY TO REMOVE
EASY TO REPLACE

In subsequent pages we expect to go into some of the other features of the COLMOL:

- High Production
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- Enlarged Applications
- Continuity of Operation
- Maneuverability
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# CUT COSTS OVER 60%

Pressure-Creosoted Oak Ties Used in a Coal Mine's Main Haulageway.

● With today's high-speed, heavy-tonnage haulage, there's no place for *bad* ties. They represent a serious hazard. And frequent replacements run into too much money.

Koppers Pressure-Creosoted Timber Ties are protected against decay. They *retain* their strength. Because of their exceptionally long life, they effect substantial savings.

For example, 3,809 sawed southern pine ties, each impregnated with creosote, were installed in a location where *untreated* ties had lasted, on the average, only 4 years. It was estimated that the *treated* ties would last 20 years; on this theoretical basis, the cost per year would be cut by more than 62%, and the net savings for the installation would be about $12,000.

After 21 years' hard service, this haulageway was inspected, and its performance reviewed. *The anticipated savings had been fully realized!* Moreover, more than 97% of the ties were still serviceable; therefore, the eventual savings will be even greater.

In many other places, Koppers Pressure-Treated Wood can save money for mine operators. For full information, send for our free book, "10 Proven Ways to Cut Mining Costs." Mail in the handy coupon, and this helpful book will be on its way to you.

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one hold, the company says. Two models are available, with capacities up to 5 tons.—*The Nolan Co., Bowerston, Ohio.*

## Quickly Connected Sheaves

Magic-Grip sheave line has been expanded to include A-B combination groove sheaves in sizes from 3 to 38 in, with one to six grooves, in both collar and non-collar types. Both the collar (Style C) and non-collar (Style NC) types are said to operate on the same principle of clamping the sheave quickly and firmly to the shaft by compressing the split tapered bushing sleeve and tightening three capscrews. They are released easily and quickly by loosening the capscrews and using two of them as jackscrews.—*Allis-Chalmers Mfg. Co., Milwaukee, Wis.*

## Speed Reducers

Two new vertical speed reducers, designated Type ND (gear shaft downward) and Type NU (gear shaft upward) are said by the manufacturer to be particularly suited to such equipment as agitators and mixers and for use with supplementary low-speed spur-gear drives without outboard bearings. Among the features cited by the company are a large-diameter output shaft with heavy tapered-roller bearings providing capacity for external radial or thrust loads, and continuous lubrication of top gearshaft bearing. Bulletin 125 available.—*Cleveland Worm & Gear Co., 3249 E. 18th St., Cleveland.*

## Corrosion-Resisting Lining

Installation of corrosion-resisting linings on old or new equipment is as simple as plastering a wall or grouting a floor with Carbo-Flux, resin- and catalyst-bearing carbon powder that is mixed into a stiff putty and applied by trowel, according to the manufacturer. Bare wood surfaces need only be dry and, when set, the lining cannot be removed from wood. Good adhesion to clean steel is obtained by using a primer. The lining readily sets at room temperatures of 70 deg. F and above. Coats on vertical surfaces can be made 1/16 in without sagging and any desired thickness can be built up with succeeding coats, it is reported. On all metal surfaces, Fiberglas cloth is laid between two coats of lining material. Without the

## Fit Thermoid Quality and Experience into Your Belting Picture

Thermoid high quality stems from continuing research and product development. To complete this picture, your Thermoid distributor and the Thermoid field representative, working as a team, offer you practical experience in solving your particular problem.

Whether it's run-of-the-mill or something "special", your Thermoid distributor can help you select the right Thermoid Conveyor Belt. And the down-to-earth advice of Thermoid field representatives is welcomed by men faced with belting trouble in mining, quarrying and construction operations. They know this advice is the result of day-by-day experience with conditions *in the field.*

**It Will Pay You to *Specify* Thermoid**

If your belting fails prematurely—if you're stumped with a tough belting problem—call your Thermoid distributor. Together with the Thermoid field representative, he can help you get greater economy, efficiency and tonnage for your belting dollar.

*Thermoid Quality Products: Transmission Belting • F.H.P. and Multiple V-Belts • Conveyor Belting • Elevator Belting • Wrapped and Molded Hose • Molded Products • Industrial Brake Linings and Friction Materials.*

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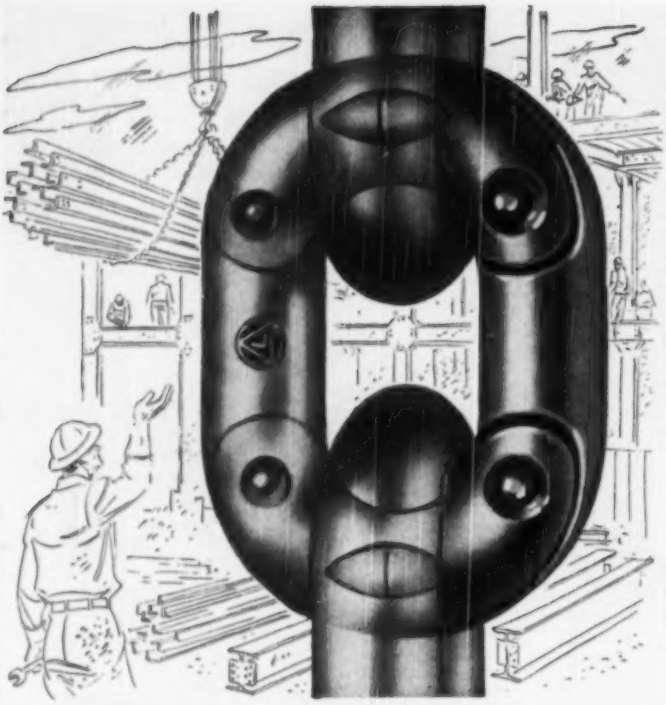


# SUPER-STRONG

## FOR EXTRA SECURITY!

*The Laughlin "MISSING LINK"* with Interlocking Safety Lugs is stronger than the chain itself!*

Replace worn or broken links in any proof coil chain with Laughlin "Missing Links" — and your chain is stronger than it ever was before! That's because the perfectly matched halves put the load on the interlocking lugs with no strain on the rivets. You get this *extra* security at worthwhile savings in time and money, too, because "Missing Links" go on in a jiffy, much quicker and cheaper than welding. Made of drop-forged, heat-treated steel, super-strong "Missing Links" are available in all sizes from 3/16" to 1⅜" at your distributor's. Write for Laughlin Catalog #145, industry's data book of fittings . . .

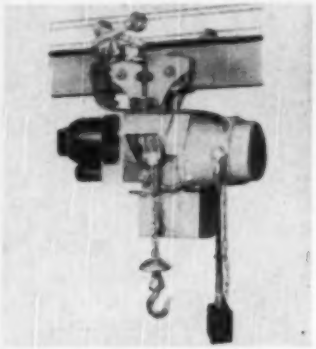
THE THOMAS LAUGHLIN COMPANY, DEPT. 6, PORTLAND 6, MAINE.

*Reg. U.S. Pat. Off.

**LAUGHLIN**

THE MOST COMPLETE LINE OF DROP-FORGED WIRE ROPE AND CHAIN FITTINGS

carbon filler, the material, known as Carbo-Kote, can be applied in 1- to 3-mil coats by brush, resulting in a highly glossy finish that is easy to clean, the company says. Bulletins C-6A and C-7 available.—*Carboline Co., 7603 Forsyth Blvd., St. Louis 5, Mo.*



### Chain-Type Hoist

Lifting speeds up to 41 fpm, lower and upper limit stops, and a wide "pick-up" angle are cited as three of the new performance features of the Load King chain-type electric hoist available in load capacities of 500, 1,000 and 1,500 lb. With the unit, the link chain supports the load over an electrically driven sheave, thus permitting extra long lifting lengths since wound-up chain does not wrap around a drum but collects in a metal container as the hook raises. The hoist hook can "reach out" as far as 30 deg from the vertical to pick up loads, according to the manufacturer. Bulletin P-1172 available. — *Yale & Towne Mfg. Co., Philadelphia Div., Philadelphia* 15.

### Improved V-Belt

New oil-resisting high-capacity Super-7 Texrope belt offering a 40% higher rating than the standard belt is said by the manufacturer to maintain the same stretch characteristics and safety-factor margin. Where specified, the high-capacity Super-7 Texrope belt can be made static-resisting.—*Allis-Chalmers Mfg. Co., Milwaukee, Wis.*

### Elevator Backstop

A simplified backstop said to automatically prevent the "backing up" or "running away" of inclined conveyors, bucket elevators and similar equipment is available as a ready-made device for immediate installation. It is the first standard-stock backstop taper-bushed to shaft size, according to the manufacturer, and is less than half the cost of the usual custom-built models. The unit is a ratchet-type device that automatically operates when power interruption, overload cutout or failure of the prime mover

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In scores of industries, users of Wickwire Rope have developed an affectionate respect for its performance, safety and long life. And, for true economy, they use Wickwire's WISSCOLAY® *Pre*formed. It lasts longer—is easier to cut, splice and install. It's kink-resistant and safer to handle. Wickwire Distributors and Rope Engineers, in key cities everywhere, are prepared to render prompt service in meeting your wire rope needs. Wickwire Rope Sales Office and Plant—Palmer, Mass.

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LOGGING

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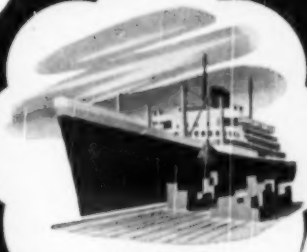

MARINE

CONSTRUCTION

*Photo of Mitchell Station, West Penn Power Co., Pittsburgh, Pa.*

**Remember back** when the brawniest men in town were the fellows who stoked the powerhouse boilers? Well, today they wear uniforms or business clothes, and sit quietly alert, like the men shown above. For from the control panels around them, they not only operate the turbines providing a city with light and power, they also feed giant furnaces with powdered coal—at the twist of a wrist.

Today, in many factories, central heating plants and huge electric generating stations throughout the country, specially prepared coals are helping to deliver more heat and more kilowatt-hours per ton. Indeed, mine operators have built million-dollar preparation plants, where coal is washed, graded, blended and treated to meet the requirements of every type of combustion equipment.

In modern equipment, coal is making possible the generation of as much as 750,000 lbs. of steam per hour from a single boiler. No wonder coal is now being used to generate almost two-thirds of America's electric power.

**Modernizing** America's bituminous coal mines means replacing "pick and shovel" mining with machines. Today more than 91% of production is mechanically cut and 64% is mechanically loaded. And among many new preparation plants now under construction is one designed to wash and grade coal for specific uses at a record rate of 2,000 tons an hour.

Largely as a result of modernization by progressive management, the American miner's average daily output is five times greater than that of the British miner and his take-home pay is higher than that paid by any other major American industry.

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**BITUMINOUS COAL . . . LIGHTS THE WAY . . . FUELS THE FIRES . . . POWERS THE PROGRESS OF AMERICA**

# NOW!—

# ONLY 1 SET OF BATTERIES

## FOR TWO-SHIFT SHUTTLE CAR OPERATION!

This is no dream—it's been done! With the new all-type battery-powered shuttle cars, equipped with operating discharge governors and hydraulic controls, you need only one set of batteries—and they can be left in the car and never removed until replacement!

How's it done? With new 40% more-power-hour batteries and a booster charging method that replenishes expended amperage while the car is discharging in face haulage. Now, batteries can run two full shifts.

This is only one of many reasons why the swing is to battery power for fast, efficient, economical underground haulage. Many others are found in the published results of 95 time studies made in mines from Pennsylvania to Illinois.*

A full report on these 95 time studies is now available in a free booklet that is yours on request. Write for your copy of "A Report of Mine Shuttle Car Operation Based on 95 Published Time Studies." Address Dept. M-10.

*"Evaluation of Underground Loading and Haulage Machines, Mechanized, 1948."

**Battery-powered shuttle cars have the following advantages demonstrated and proved:**

*SAFETY*
Only battery cars are "permissible"

*PRODUCTION*
Can produce 10% more tonnage
Deliver more tons per man shift
Give 22% more ton-miles per shuttle car hour

*PERFORMANCE*
Include all design advances
Travel 25% faster
Discharge 30% faster
Are more dependable and predictable
Handle supplies easier
Reduce shuttle car change time
Can gob underground
Promote section efficiency

*COST*
Equal capital cost
Produce coal in shuttle car sections for approximately ½c less per ton** —in hand-loaded sections, as much as 75c a ton

**"Shuttle Car Haulage, AIME, Technical Publication No. 2198.

**A "MUST" FOR CONTINUOUS MINING MACHINES**

Battery-powered shuttle cars enable continuous mining machines to work 10% more of the shift.

**AND . . .**

Two-shift operation is now possible with only one set of batteries.

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STORAGE BATTERY CORPORATION

Always Use Gould Automobile and Truck Batteries

The Gould "BAM" 13-"E" Battery
Most Rugged Locomotive Battery
America's Finest Mining Battery

TWO WAYS TO
SAVE MONEY

SAFER FASTER CHEAPER

WEST VIRGINIA ROOF BOLTS

WEST VIRGINIA PRE-FABRICATED TRACK

Used together, West Virginia roof suspension bolts and West Virginia pre-fabricated track compound savings in modern mining operation. Here's how:

West Virginia roof suspension bolts are economical, dependable and convenient. By rigidly supporting the roof without timbering, roof bolts leave the passageway clear for the full speed operation of loading machines, efficient and fast laying of track, and the fast, unhampered operation of cars and motors.

When West Virginia pre-planned, pre-fabricated track is used, installation is simplified to the last degree. Track is supplied in easy-to-handle, factory planned and fabricated turnouts, curves and rails made to exact specifications, requiring only laying the track in place on the job.

There are many other advantages to using West Virginia roof bolts and West Virginia pre-fabricated track. Write today for complete information about these two products and their application to your particular problem.

COSTS LESS TO INSTALL
EASY TO HANDLE

Manufacturers of
RAILS and ACCESSORIES
TRACK WORK
STEEL TIES

West Virginia
Steel & Manufacturing Co.
Huntington, West Virginia


occurs and can be mounted in any position on the head shafts of conveyors or elevators.—*American Pulley Co.*, 4200 *Wissahickon Ave., Philadelphia* 29.

## Equipment Shorts

**EXCAVATOR CONTROL**—A new mechanical booster clutch is said to reduce lever pull for the operator more than 50% on the Model 304 Koehring ¾-yd excavator. Other features cited include marked increases in production, simplified operation and longer life for the excavator and its parts.—*Koehring Co., Milwaukee* 16, *Wis.*

**WELDING COVER PLATE**—New clear-plastic cover plates designed to protect costly welding plates from damage are said not to pit as readily from welding spatter as glass plates; are 0.060 in thick, assuring adequate impact resistance; and will outlast ordinary glass cover plates many times. Two sizes are available: standard 2x4¼ in and 2x4⅛ in, provided on special order.—*American Optical Co., Southbridge, Mass.*

**NEW THREE-PIECE SEAL** for cylinders and shafts features a staggered step on the inner of the three rings said to eliminate leakage of air, gas or liquid. The seal can be made of any non-corrosive material or of practically any metal alloy, thus avoiding or retarding rust, tarnish or other corrosion in various hydraulic solutions, the manufacturer reports.—*Auto-Diesel Piston Ring Co.*, 3145 *Superior Ave., Cleveland* 14, *Ohio.*

**ELECTRIC HAMMER**—A new patented principle of motion conversion is said to provide almost vibrationless operation, light weight and low cost in the new 7½-lb "Super-Slugger" electric hammer, that reportedly will make quick clean cuts in auto-gage steel at a speed of 6 in per sec without a starting hole, and drill concrete or masonry at 1 in per min.—*Noble & Stanton, Inc.*, 1053 *Broadway, Bedford, Ohio.*

**AIR - AND - HYDRAULIC - CYLINDER** line includes the new-duty series for use in straight-line motion, and for remote-control operation, material handling, clamping or holding, and other uses. They report-

# FIRST STEAM HOSE TO GIVE OVER 2000 HOURS CONTINUOUS SERVICE

**at 200 lbs. Working Pressure!**

Steam Hose users have long been stymied by the costly problem of tube-swelling during normal service life of ordinary hose. They turned to BWH for the solution.

BWH came up with the answer . . . CONCORD #20! In building this revolutionary new hose, the rubber tube was first locked securely between two braids of high tensile steel wire. The cover and static wires were added. Then the new construction was subjected to a *continuous flow* of 200 lbs. steam pressure *for over 2000 hours!* At the end of this record-smashing test, the tube showed no evidence of hardening or swelling! Couplings were re-attached without the slightest difficulty because the original inside diameter of the tube was maintained throughout!

Next to the rugged abrasion-resistant cover is an open weave of asbestos braid which assures cover adhesion and includes new type static-conducting wires.

Ask your BWH distributor to demonstrate the whip-like flexibility of this rugged new hose. Check the braids of high-tensile steel wire which give it strength without bulk. Concord #20 does the job without breaking the operator's back, guards against "flash" explosions and, from the inside out, assures unequalled service life.

**HAVE YOU A JOB WHERE STAMINA COUNTS?**

Bring us your toughest problems. We're specialists in solving them. Consult your nearest BWH distributor or write us direct.

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**BOSTON WOVEN HOSE & RUBBER COMPANY**

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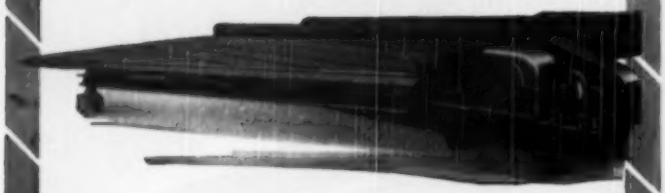
# The *SuperDuty* Diagonal Deck Keeps Pace with PUSH BUTTON MINING



As mine mechanization advances, more and more coal washing installations include SuperDuty Diagonal Deck Tables. From small mines to large, from single units to table batteries of any size, the SuperDuty is proving its ability to increase production of quality washed fine sizes at substantial savings in costs.

Not the least of the Diagonal Deck economies is a greatly reduced labor cost. One man operates as many SuperDutys as he can see. Each of the many sizable installations to date are operated with one attendant.

Proof of the Diagonal Deck efficiency is found in the predominance of SuperDuty Tables in recent installations.

For full information, ask for Bulletin 119.

**CONCENCO FEED DISTRIBUTOR**

The Concenco Revolving Feed Distributors are heavily fabricated all steel machines, with motor drives requiring 1 H.P. or less in operation. They effectively provide a splitting of feed into any desired number of equal portions, feeding any number of circuits or machines in battery for greater overall efficiency. Unexcelled for feeding coal washing tables.

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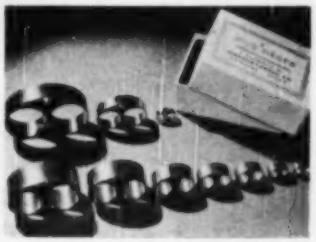
CONCENCO PRODUCTS

★ *The ORIGINAL Deister Company* ★ *Inc. 1906*

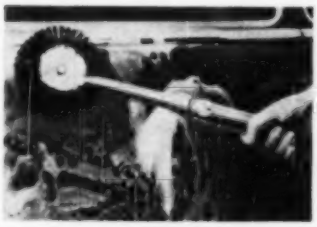

edly utilize tie-rod construction to give positive protection against leakage at joint of tube and head, and chevron packing to seal the piston rod. —*Ledeen Mfg. Co., 1600 S. San Pedro St., Los Angeles 15, Calif.*

**LOCKNUTS AND LOCKWASHERS**—New line of bearing-positioning locknuts and lockwashers is especially designed for effectively locking various makes of ball and roller bearings in correct position on shafts of 5/16 to 7 11/16 in in diameter. Features cited include precision manufacture to ABEC and SAE standards; ease of installation and removal; rust-resistant; vibration-proof; smooth; burr-free. Bulletin 2348 available.—*Link-Belt Co., 307 N. Michigan Ave., Chicago 1.*



**TRIAL CLAMPS**—Kit of eleven trial clamps permits user to select proper clamping pressure for applications such as tool holders, welding jigs, hangers for pipe or wire and other gripping jobs. Constant pressure, wide dimensional range, single-part construction, automatic takeup and flexibility are features of these clamps.—*Hunter Spring Co., Lansdale, Pa.*

**NEW "COLD-WELDING" CAST IRON ELECTRODE** requires less current for deposition and reduces risks of stress and distortion, says the manufacturer. Extreme density, freedom from porosity and cross checks and excellent machineability are claimed for metal deposited from Eutectrode 24 "Formula 1950.—*Eutectic Welding Alloys Corp., 40 Worth St., New York 13.*

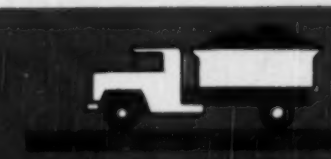


**VEHICLE WASHER**—New automatic-valve attachment for Swirl-O-Matic brush feeds detergent or clear water into the brush or turns off water completely by simple operation of the valve control. The brush unit is attachable to any garden hose, automatically revolving as a result of the

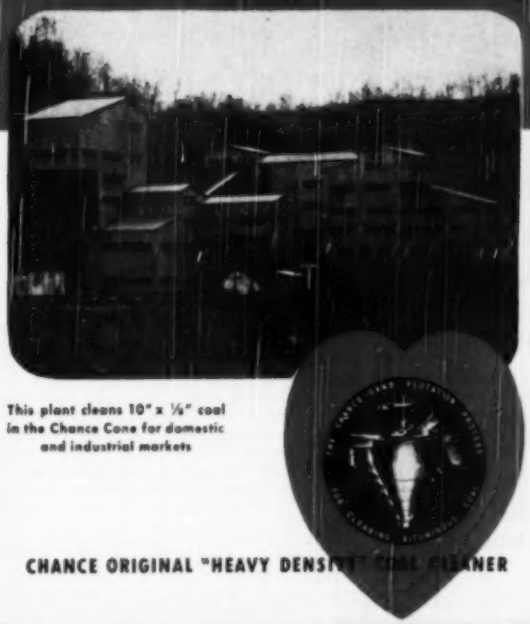
# 89,747,000 TONS OF BITUMINOUS COAL

were delivered by

RETAIL DEALERS FOR DOMESTIC USE IN 1948



*Here's a market for Premium Coal*



This plant cleans 10" x ⅛" coal in the Chance Cone for domestic and industrial markets

CHANCE ORIGINAL "HEAVY DENSITY" COAL CLEANER

● Fairmont Machinery Company can help you capture your share of many desirable markets.

Clean coal, scientifically prepared, is always in demand at premium prices. Domestic users are aware of the additional advantages offered in correctly prepared coal for clean, economical heating.

Fairmont designs and builds complete coal preparation systems—Chance Sand Flotation Process for Wet Cleaning and American Pneumatic Separator for Dry Cleaning.

Fairmont Engineers are available to help you determine the method of coal preparation best suited to your operation.

## FAIRMONT MACHINERY COMPANY

**FAIRMONT, WEST VIRGINIA**

Designers and Constructors of Chance Sand Flotation Process for Wet Cleaning and American Pneumatic Separator for Dry Cleaning

For Maximum
SAFETY!
SPEED!
DEPENDABILITY!

*I'll Take...*

**DUFF-NORTON**

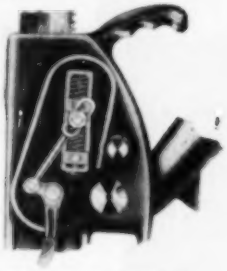
**Mine JACKS**

No. 514-MT for THIN SEAMS

No. 516-MT for MEDIUM SEAMS

No. 521-MT for THICK SEAMS

The three Duff-Norton Jacks illustrated simplify selection of jacks for thin, medium and thick seam mines. All are of five ton capacity . . . the 514-MT is 14" high with a 7½"lift . . . the 516-MT is 16" high with a 9½" lift . . . and the 521-MT is 21" high with a 14½" lift. These jacks perform every lifting and lowering job with ease. For quotation, specify jacks by number.



**STURDY SPRING**

This world-famous patented spring mechanism is an adjustable, self-contained unit, that assures positive pawl action. Jacks cannot be tripped under load, safeguarding men and equipment.

*Write today for the*
"HANDY MINE JACK GUIDE"

THE **DUFF-NORTON** MANUFACTURING CO.
MAIN PLANT and GENERAL OFFICES, PITTSBURGH 30, PA.—CANADIAN PLANT, TORONTO 6, ONT.
*"The House that Jacks Built"*


water pressure.—*Melaire Distributing Co., 420 Lexington Ave., New York 17.*

**SAFETY DROP HOOK,** said to be capable of lifting, hauling and easily releasing any weight as simply as a man handles a 1-lb weight, is a mechanical-type unit using toggle action and is factory-tested at 100% overload. With the model now in production, the mechanism locks securely at all times but a 40-lb pull on the release lever will quickly and efficiently release a 3-ton load.—*Coffing Hoist Co., Danville, Ill.*

**BRONZE BARS,** cored or solid, are offered in all popular sizes, either rough or machined, for shop fabrication of bearings and bearing surfaces. Good machineability, high resistance to shock and wear and effective anti-friction performance are reported by the manufacturer. Bulletin available. —*American Brake Shoe Co., 4930 Manchester Ave., St. Louis 10, Mo.*

**ANTI-RUST PAINT** — New Rust-rem-Clear paint reportedly can be brushed or sprayed directly over rust without wire brushing or scraping and can be painted over with any good-quality paint, except lacquer. As it will not bleed through painted surfaces, it is effective as a rustproofing primer and undercoater, it is said.—*Speco, Inc., 7308 Associate Ave., Cleveland 9.*

**STEEL-HARDENING COMPOUND** —New low-cost quick-acting steel-hardening compound, Hard-N-Deep, is a powdered chromium-carbon material said to contain an exclusive catalyst, XL-7, that speeds up the hardening process and permits it to work at relatively low temperatures. With heat, Hard-N-Deep reportedly penetrates the metal surface and produces a carbonizing, nitriding and chromizing action to provide a tough, uniform case without appreciable change in surface dimensions.—*Miracaloy Corp., 50 Broadway, New York 4.*

**FLOODLIGHT** — New Type VE-18 open floodlight, meeting NEMA Standard FL6-200, Type 6, Group C, is a 750-1,500 watt open-type all-porcelain unit suitable for general area lighting, construction, etc. The unit is of one-piece welded-steel construction, with porcelain enamel finish, gray outside and white inside, with average reflectivity of 82% or more and a beam efficiency exceeding 70%. A new bracket is available to extend the Westinghouse Swing-Over

## QUAKER HOSE LASTS FIVE TIMES AS LONG

**Hundred degree temperatures and plenty of twisting, crushing and abrasion were killers to air hose in a Texas installation. The usual air hose lasted only two or three weeks.**

**Then QUAKER Blue Devil Air Hose was connected to the compressors. The result! Seventeen weeks of continuous, rugged service and QUAKER was still on the job. Life expectancy of this hose . . . at least 25 weeks!**

**Performance like this is typical of QUAKER Hose throughout industry—and that's why QUAKER Hose is standard equipment in leading plants throughout the country.**

**QUAKER'S full line of pre-tested hose meets every requirement of the Coal Industry.**

### BELTING FOR LOWER-COST HANDLING

Regardless if you are moving bulk materials or package goods, there is a QUAKER Conveyor Belt to do the job.

### PACKING WITH THE POSITIVE SEAL

QUAKER Packings are engineered for every industrial application—for pumps, compressors, water, air and steam lines.

**QUAKER RUBBER CORPORATION · PHILADELPHIA 24, PA.**

*Division of H. K. Porter Company, Inc.*

Pittsburgh • New York • Cleveland • Chicago • Houston • Atlanta

Western Territory

QUAKER PACIFIC RUBBER CO. • San Francisco • Los Angeles • Seattle

# QUAKER RUBBER PRODUCTS

*custom made for every industrial use*

feature to all bayonet-heel-construction floodlights.—*Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.*

**LUBRICATION DEVICE** — New combination visible oil cup and gage can be used as a visible oil cup to replenish oil in bearings, etc., and also as an oil gage for checking oil level. With its visible feature, it can be installed at any convenient distance from a machine.—Bulletin 31 available.—*Trico Fuse Mfg. Co., Milwaukee 12, Wis.*

# Equipment Publications

**New Bulletins Available Without Charge on Request to the Manufacturer—Arranged for Your Convenience to Permit a Quick Check of Items of Interest—Literature on New Equipment Described on Previous Pages Also Is Normally Available From the Manufacturers.**

**AERIAL SURVEYS AND MAPS**—Jack Ammann, Photogrammetric Engineers, 329 N. St. Mary's St., San Antonio 2, Tex. Bulletin "Air Speeds to Your Map Needs" illustrates and describes in detail the company's methods and services in making aerial surveys and maps.

**ALLOY CASTINGS**—Lebanon Steel Foundry, Lebanon, Pa. Two revised steel-casting reference charts covering 33 selected grades of carbon and low alloy, stainless, corrosion-and heat-resistant alloys contain specification designations, analyses, physical properties, heat treatments and related data on 18 high alloys and 15 low alloys and carbon steels.

**AIR COMPRESSOR**—Davey Compressor Co., Kent, Ohio. Bulletin E-333 describes the new Model 60-WBD 60-cfm Super Chief portable compressor.

**ARC WELDERS**—Hobart Bros. Co., Troy, Ohio. Folder shows and describes 15 features of portable gasoline-engine-driven arc welders and includes specifications of 10 different models of gasoline-engine-driven arc welders and combination models of arc welders and power units.

**DIESEL ENGINES**—Cummins Engine Co., Columbus, Ind. Bulletin 5296 contains complete specifications of HRBB-600 (highway) and HRBBI-600 (off-highway) Cummins diesels; four-cycle six-cylinder models with a maximum rating of 175 hp at 2,000 rpm. Complete specifications for automotive and industrial models of two V-type 12-cylinder Cummins diesels, the supercharged 550-hp (maximum) NVHS engine and the naturally aspirated 400-hp (maximum) NVH engine, are contained in two additional bulletins, Nos. 5295 and 5294, respectively.

**DIESEL TORQUE CONVERTER**—Detroit Diesel Engine Div., General Motors Corp., Detroit 28, Mich. Booklet, "The New General Motors Diesel Engine—Torque Converter Unit," offers detailed information on what a torque converter is and how it functions, where and how it has been applied, and the possibilities of engineering particular applications in any field.

**DUST COLLECTORS** — Prat - Daniel Corp., East Port Chester, Conn. Catalog 2505 provides detailed information on the new Valmont Type S dust collector and the Standard Type HC, with the latest information on the high, narrow inlet slot, a feature of the Valmont Type S that is said to increase collection efficiency in the range below 20 microns.

**DUCT INSULATION**—Grant Wilson, Inc., 141 Jackson Blvd., Chicago 4. Folder 554 illustrates insulation of all bare duct and pipe lines with flexible asbestos-protected Dux-Sulation, with samples available on request.

**ELECTRIC MOTORS**—Electric Machinery Mfg. Co., Minneapolis 13, Minn. Publication, Synchronizer No. 19, discusses "How to Select Motor Drives For Large Crushers and Grinders," in addition to other information on the application of motors, generators and control in the mining industry.

**ELECTRIC MOTORS**—General Electric Co., Schenectady 5, N. Y. Bulletin GEA-5332 on low-speed synchronous motors illustrates typical installations of the high-power-factor constant-speed drives, describes their construction features and indicates mechanical modifications and performance data. Covered are Type TS (three-phase) and Type QS (two-phase) motors in the "6000 series," with frame sizes of 6184 and larger and ratings from 20 to 15,000 hp.

**ELECTRIC MOTORS**—Reliance Electric & Engineering Co., 1088 Ivanhoe Rd., Cleveland 10, Ohio. Bulletin C-130 covers construction and features of explosionproof motors from ¾ to 125 hp, with particular emphasis on those of the Class I Group D design, for application in hazardous locations.

**ELECTRODES**—Hobart Bros. Co., Troy, Ohio. Catalog offers descriptions, application data, welding procedure, mechanical properties and specifications of electrodes in the Hobart line.

**ELECTROSTATIC PRECIPITATION**—General Electric Co., Schenectady 5, N. Y. Bulletin GEA-5213 explains how electrostatic precipitation works, gives case histories of seven typical installations and describes the various methods of electrostatic precipitation and the electric equipment applicable to each method.

**FIRE HAZARDS**—Randolph Laboratories, Inc., 9 E. Kinzie St., Chicago 11. Pocket-sized "Fire Hazard Index" lists, in quick-reference alphabetical order, over 590 chemical, gas and common fire-hazard materials and specifies type of fire-fighting agent to use on each, as recommended by the Board of Fire Underwriters and the National Fire Protection Association. It also contains basic facts on fire-fighting principles.

**FLOTATION** — Western Machinery Co., 760 Folsom St., San Francisco 7. Bulletin F-5-C-1 on the Fagergren flotation machine discusses and illustrates operating principles and mechanical construction, covering capacities, dimensional data, horsepower requirements, shipping weights and other essential information on all sizes.

**HARD-SURFACING ELECTRODES**—Stulz-Sickles Co., 134 Lafayette St., Newark 5, N. J. Folder describes features, properties and welding procedure with Seaco hard-surfacing electrodes.

**HOISTS**—American Hoist & Derrick Co., 63 S. Robert St., St. Paul 1, Minn. Two new catalogs on the American line of general-purpose hoists discuss construction, features and operation. Catalog 100-H-40 covers units from 5 to 40 hp; Catalog 100-H-55, units from 50 to 100 hp.

**INSULATED PIPING**—Ric-Wil Co., Dept. J-1, Union Commerce Bldg., Cleveland, Ohio. "Insulated Piping System Catalog—Section 480-4" illustrates and describes the manufacture, construction, and installation of various types of Ric-Wil insulated piping. "Insulated Piping System Technical Data—Section 480-5"—contains full illustrated technical data and specifications on all phases of insulated piping.

**LIFT TRUCKS**—Lewis-Shepard Products, Inc., 263 Walnut St., Watertown 72, Mass. Bulletin 26 provides complete information on the Lewis-Shepard line of hand-lift trucks and Weldmaster skid platforms, with details of the trucks in capacities from 500 to 15,000 lb and more.

**MECHANICAL-RUBBER PRODUCTS**—New York Rubber Corp., 250 Fifth Ave., New York. Catalog presents a detailed discussion of construction, features and application of conveyor, elevating and transmission belting, industrial hose, packing, diaphragms and other products. In addition to capacities, specifications and other detailed information, the booklet offers varied belting engineering data.

**MOBILE COAL DRILLS**—Joy Mfg. Co., Oliver Bldg., Pittsburgh 22, Pa. Bulletin C-46 describes the complete Joy line of seven self-propelled drills for high-speed operation under varying mine conditions. Complete specifications, dimension prints and cutaway drawings are provided on the units, which include both hydraulic- and electric-type drills, either track- or rubber-tire mounted.

**POWER DISTRIBUTION** — Trumbull Electric Mfg. Co., Plainville, Conn. Catalog TEB-1 discusses LVD and SAC Flex-A-Power heavy duty power distribution systems. It describes construction details, accessories, engineering data, application information and offers a comparative analysis between Flex-A-Power and wire and conduit on a basis of cost and performance.

**POWER TOOLS**—Independent Pneumatic Tool Co., Aurora, Ill. Circular JE-1145 offers complete data on the new Thor "Copper-Line" tools, covering the new Thor ¼ and ½-in drills and the new drill stands available for them.

**ROCK DRILL AND TOOLS**—Independent Pneumatic Tool Co., Aurora, Ill. Circular JE-1139 describes the new Thor Model 25 sinker rock drill, with complete tool specifications supplemented by cutaway drawings of integral parts of the new 25-lb tool. Circular JE-1132 catalogs four Thor mining tools, describing and illustrating a new sinker leg, air-bar feed, pneumatic column and stoper leg.

**ROLLER CHAIN**—Chain Belt Co., 1600 W. Bruce St., Milwaukee 4, Wis. Bulletin 50-6 illustrates and describes Baldwin-Rex "BA" riveted roller chain assembly and includes tables and examples showing suggested combinations of the units for various length drives, construction diagrams, list prices, specifications and dimensions.

**RUBBER-LINED PIPE**—Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J. Bulletin 6907 describes construction and features of Manhattan rubber-lined pipe for use with conditions of corrosion, contamination, abrasion, or flow-restricting deposits. Also included are data and specifications on Condor flexible rubber pipe and acid hose.

**RUBBER SHEET PACKING**—B. F. Goodrich Co., Akron, Ohio. Bulletin lists

# DESIGNED for the TOUGHEST JOBS!

A Model LD Rear-Dump "Euc" receives a 30-ton load of rock overburden from a 6-yard shovel at a Pennsylvania open pit anthracite operation. Owner: Pioneer Construction Co. of Shamokin, Pa.

22 tons of overburden from an open pit copper mine in Arizona are dumped over the waste bank by a Model TD Euclid. Isbell Construction Co. of Reno, Nevada owns a large fleet of these Rear-Dumps.

# "EUCS"

## Assure HIGH PRODUCTION at LOW COST

Rear-Dump Euclids are built for long, efficient service in open pit mines and quarries and off-the-highway construction and industrial work. For moving rock, coal, ore, overburden, and other heavy excavation, Rear-Dump "Eucs" have the capacity and speed to haul bigger loads faster and at lower cost per ton or yard moved.

There are models for every hauling requirement... and body designs for all types of materials. Rear-Dump Euclids of 10 to 34-ton capacity are ruggedly constructed to withstand the impacts of loading heavy excavation and hauling over rough roads. Outstanding features include the Euclid planetary type drive axle for long life and continuous performance... sturdy body with smooth interior and flared rear chute... welded frame of tremendous strength... fast, double-acting hydraulic hoist... and loaded travel speeds up to 35.4 m.p.h.

The parts and service facilities of Euclid's world-wide distributor organization assure prompt, efficient service wherever Euclids are used. Write for complete information on the Euclid line of earth moving equipment or see your distributor . . . today!

**The EUCLID ROAD MACHINERY Co.** Cleveland 17, Ohio

EUCLIDS *Move the Earth*

# RECOMMENDATIONS ON MAGNETIC SEPARATORS for taking Tramp Iron out of Coal

THERE is a Dings Magnetic Separator for every preparation plant requirement . . . from "the world's largest rectangular suspended magnet" to the little Alnico Perma-Plate magnets for lowest cost separation. Detailed descriptive literature and recommendations from Dings engineers are available on request to help you select the separator best suited to your needs.

## MAGNETIC PULLEYS

Magnetic Pulleys are recommended on the majority of belt conveyor installations because they *automatically* remove and discharge the tramp iron.

**NEW! THE ALNICO PERMA-PULLEY**—magnetic permanence *guaranteed* for the life of the installation . . . powerful, trouble-free. Suitable for most pulley requirements. Ask for Catalog C-1007A.

**AIR-COOLED ELECTROMAGNETIC PULLEY**—recommended for very heavy burdens because of great depth of magnetic flux penetration. Catalog C-1001A.

## RECTANGULAR ELECTROMAGNETS

Uniform magnetic flux pattern across entire face of magnet, plus great depth of magnetic penetration and high surface strength, make Dings triple pole rectangular magnets the most powerful tramp iron magnets available.

**CHUTE TYPE**—stepped face helps arrest and hold iron mechanically as well as providing extra magnetic edges for intense magnetic concentration. Available with automatic safety gate to stop flow if current is interrupted; gate also used to remove accumulated iron. Catalog 301-A.

**SUSPENDED TYPE**—recommended for use above belt where pulley is not applicable due to excessive speed, burden depth or other reasons. Also used above chutes. Available in AUTOMATIC SELF-CLEANING TYPE with cross belt which discharges iron to the side. Ask for Catalog 301-A.

## NEW! PERMA-PLATE MAGNETS

Here's low cost, powerful, permanent magnetic protection. For installation above or in chutes and above belts. Ideal for stoker protection. Non-electric; magnetic permanence *guaranteed* for life of installation. Send for Bulletin B-1205A.

Dings MAGNETIC SEPARATION HIGH INTENSITY

**DINGS MAGNETIC SEPARATOR CO.**
**4720 W. Electric Avenue**
**Milwaukee 14, Wis.**

*"Separation Headquarters Since 1899"*


specifications and uses of various types of rubber sheet packing for handling liquids, gases and abrasives.

**SPECIALIZED HOSE**—B. F. Goodrich Co., Akron, Ohio. Catalog section on sand blast hose and hose used in butane and propane gas service lists specifications, describes materials and methods used in construction of the hose and recommended uses.

**SPEED REDUCER** — Dodge Mfg. Corp., Mishawaka, Ind. Bulletin A-470, designed to simplify selection of the new Dodge Torque-Arm speed reducer, presents the complete story, augmented by full-size photos of the entire mechanism and simplified selection tables. The only information required to select the proper sized reducer for a given application is the horsepower required and the speed and size of the shaft to be driven. The tables also facilitate determining size of V-belts and sheaves.

**STEEL SHAFTS**—De Laval Steam Turbine Co., Trenton 2, N. J. Bulletin G-7, "Useful Data for Determining Stresses, Torques, Bending Moments and Deflections in Steel Shafts," contains varied formulas, curves and tables and is designed to assist designers and engineers working with round, square, hollow, keyway and stepped shafts.

**STORAGE-BATTERY OPERATION**—Gould Storage Battery Corp., Trenton 7, N. J. Revised second edition of pocket-size handbook of technical instructions and engineering data on the care of motive-power storage batteries contains a new 4-p section on the theory of the lead-acid battery. Other "practical" sections cover the following: care and operation, maintenance and repairs, parts and technical data. The handbook is designed to help battery purchasers, users and maintenance men.

**TANKS**—Black, Sivalls & Bryson, Inc., 720 Delaware, Kansas City 6, Mo. Bulletin covers pressure vessels and tanks, "Safwalk" steel walkways, air-compressor safety heads, wood tanks and other BS&B products.

**TRANSFORMERS**—Erie Electric Co., 120 Church St., Buffalo, N. Y. Bulletin discusses the construction and features of Niagara "Quality-Built" transformers and illustrates numerous applications under varying operating requirements.

**V-BELT DRIVES** — Allis-Chalmers Mfg. Co., Milwaukee, Wis. Inventory-survey check list offers suggestions to help users determine the exact condition of their V-belt drives. The standards contained in the check list permit users to decide which of their belt sets are satisfactory as is, which will shortly require replacement and which need immediate replacement, and is designed to cover the drive problems in most plants.

**VIBRATING SCREENS**—Deister Machine Co., Ft. Wayne, Ind. Bulletin 50, "Better Sizing—Cheaper," is designed as a guide to the selection of vibrating screens for every type of sizing and scalping operation and contains photographs and working information on screen sizes, production capacity and service for a wide variety of applications, along with an explanation of the mechanical features of Deister screens and the high-capacity elliptical-throw principle embodied in them. Bulletin 52 describes the recently announced high-speed non-blinding vibrating screen for handling damp, sticky materials such as carbon coal and contains detailed construction and operating data.

**WELDING RODS**—All-State Welding Alloys Co., Inc., 273 Ferris Ave., White Plains, N. Y. Low-temperature welding booklet lists all the All-State rods and fluxes, including several new items, and covers characteristics, application information and helpful operating hints.

# Judge it by the jobs it handles

## TIGER BRAND WIRE ROPE

LIFTING ROCK. Tiger Brand Wire Rope is used extensively at the Cleveland Quarries to lift blocks of limestone weighing many tons. The problem here is to obtain a rope with high abrasion resistance, great strength and the proper flexibility for use on small sheaves. Tiger Brand is giving long service under these severe conditions.

THE TIGER SWINGS IT on a special sling made for handling heavy blocks of stone. Wire Rope slings can be obtained to fit your own needs. They do not wear away like hemp and there is no weakest link, as in chains.

HAULING COAL UP A 30° SLOPE. This is an unusual application where the high tensile strength of Tiger Brand Wire Rope assures utmost safety.

NO job is too big . . . too small . . . or too tough for Tiger Brand Wire Rope. You'll find it scooping up 40 cubic yards or more of dirt and rock at a bite on the biggest power shovels—or your wife may be using a smaller size for a clothes line. In either case the rope is correctly designed for the job it handles.

Whatever the application, the Tiger Brand Specialist in your area can help you choose the best wire rope for your needs . . . and he can give you valuable tips on how to care for your rope to get the most service per dollar of cost. Call him in or write for our 125-page handbook on American Tiger Brand Wire Rope. It's yours for the asking.

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA STEEL COMPANY, SAN FRANCISCO
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM, SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

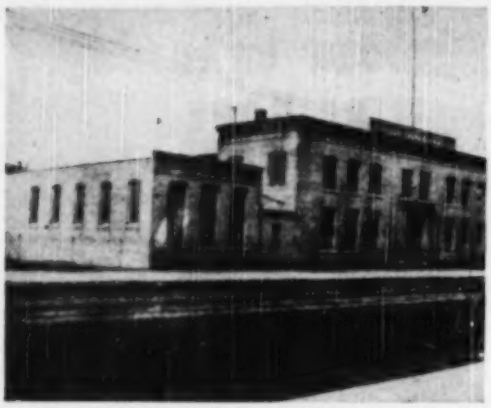
USS

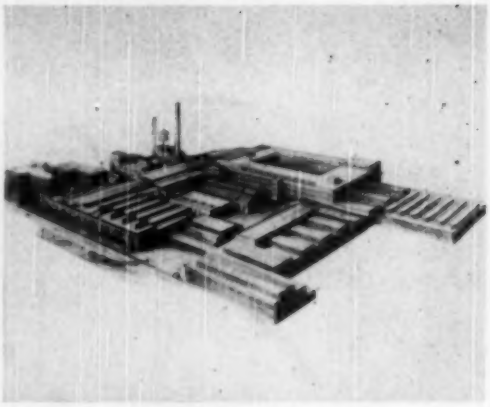
## AMERICAN TIGER BRAND WIRE ROPE

*Excellay Preformed*

UNITED STATES STEEL

# Among the Manufacturers





**GOODMAN PLANT IN 1900 (left) and in 1950 show company growth in . . .**

## 50 Years of Building Mining Machinery

THE GOODMAN MFG. CO., Chicago, builders of underground electric mining machinery, will mark its 50th anniversary of service to the mining industry April 23. From the original plant, consisting of a combined factory and office, a blacksmith shop and a power house, the Goodman establishment has grown to include 25 buildings covering 16 acres. Breast machines and locomotives were the early bulwarks of the business which, in 1900, also included dynamos, engines, switchboards, belts, longwall machines, electric pumps and supply and repair items.

Goodman now builds a complete line of cutting machines, loaders, conveyors, locomotives and shuttle cars for service in both coal and metal mines in the United States and in practically every other country where mining is conducted. William E. Goodman, son of Herbert E. Goodman, founder of the company, is president. Another son, Howard Goodman, is executive vice president in charge of production. An open house will be held for Goodman employees and their families April 15.

**Richard S. Wharton**, formerly vice president in charge of sales, Quaker Rubber Corp., has joined Hewitt-Robins, Inc., New York, as sales manager of the Hewitt Rubber Div. Mr. Wharton comes to Hewitt Rubber after 33 yr with Quaker Rubber, during which time he rose from clerk, through the sales department, to vice president in charge.

**Frank R. Freyler** has been promoted to manager of the Allis-Chalmers Mid-Atlantic region, succeeding William Arthur, who has requested retirement. Mr. Freyler, who has been with A-C for 21 yr, formerly was Philadelphia district manager. Arthur D. Brown, manager of the firm's Washington, D. C., office since 1947, succeeds Mr. Freyler as manager of the Philadelphia district office. R. N. Landreth, who has been associated with the Washington office since 1934, is the new manager of that office.

**Link-Belt Co.**, Chicago, has named H. Walter Regensburger chief engineer of its general engineering department, to succeed Harry L. Strube, who has retired after many years' service in sales and executive engineering capacities. The department has been transferred from Philadelphia to 301 W. Pershing Rd., Chicago. Assisting Mr. Regensburger will be Charles M. Young Jr. as chief developmental engineer, and Harold F. Watson as chief standards engineer, both of whom have been with the department since it was first organized in Philadelphia in 1946. Mr. Regensburger, who joined Link-Belt in 1926, formerly was assistant chief engineer for the company.

A **new General Electric** apparatus sales district, twelfth in the nationwide G-E Apparatus Department sales system, has been established with headquarters in St. Louis, Mo. G. F. Maughmer, with the company since 1923 and formerly manager of the Los Angeles sales office, has been appointed to head the new organization, which will consist of the company's St. Louis, Kansas City and Omaha territories. The staff of industry and product application specialists in the district will be increased to provide customers with greater specialized aid in application of electric equipment.

**The Reliance Electric & Engineering Co.**, Cleveland, has opened a new sales office in Charleston, W. Va., to offer increased sales and engineering service to customers in the area. William C. McConnell, a sales engineer in the Pittsburgh district for the past 2 yr, is branch manager of the new office.

**C. R. Daniels, Inc.**, Baltimore, Md., has completed new and expanded facilities for the manufacture of brattice cloth, including a new building housing the latest-type machinery for fireproofing. Primary objective of the expansion is to increase production to permit maintaining full dealer stocks in all widths and weights, according to the company.

**Hobart Bros. Co.**, Troy, Ohio, has named White Welding Supply Co., St. Louis, Mo., to represent it exclusively in the sale of Hobart products in metropolitan St. Louis and the surrounding Missouri and Illinois area.

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CYANAMID COMPANY
EXPLOSIVES

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You can get quick deliveries of AMERICAN explosives and blasting supplies from our well located plants and distributing magazines. The AMERICAN line includes explosives exactly suited to your requirements—produced under intensive research, close chemical control, and unremitting care in manufacture. Always specify AMERICAN.

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***High Explosives *Permissibles**

***Blasting Powder *Blasting Accessories**

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Sales Offices: Pittsburgh, Pa. • Bluefield, W. Va. • Scranton, Pa. • Chicago, Ill. • Pottsville, Pa. • Maynard, Mass.

SMALL HOLES?
CERTAINLY!
WITH
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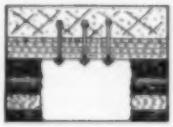
DRILL STEEL

for installing
SUSPENSION ROOF SUPPORTS



Drill holes down to 1¼" diameter with Rock-Bit's Intraset Drill Steel. Supplied in all popular sizes, with shanks to fit any hammer. The tungsten carbide tip cutting edge steps up drilling speeds 3 to 1 over conventional types, to reduce drilling costs.

After two years of field tests, involving 25,000 pieces of Intraset steel, the life expectancy of Intraset has shown an increase of 100 to 1, in comparison with a steel bit, and in some operations 200 to 1. One piece construction—no threads.

Put our broad experience with suspension roof supports to work in cutting your costs—boosting your output. Write us today! Rock Bit Sales & Service Co., 2514 East Cumberland St., Phila. 25, Pa. *Branch:* Asheville, N. C. *A complete Line of Pneumatic Tool Accessories.*

ROCK-BIT'S
*Intraset*
DRILL STEEL
TUNGSTEN CARBIDE TIPPED

## Nine-Car General Electric "Power Special" to Tour Nation

OFFICIALS of the General Electric Co. examine a model of the "More Power to America Special," the first train of its kind in industrial history. The company's Apparatus Department will launch the train this spring on a nationwide tour of key industrial centers for inspection by utility and industrial executives and municipal leaders. Exhibits of more than 2,000 electrical products, processes and techniques, ranging from precise aircraft instruments to complex working models of steel-mill and other industry equipment, will be displayed. The entire nine-car display will be designed to portray the latest advances in power generation and methods and equipment for the profitable use of electricity throughout industry. The train will be hauled by an Alco-GE two-unit 4,000-hp diesel-electric locomotive, which also will be open to inspection.

Company officials inspecting the scale model are C. H. Lang (left), vice president in charge of sales, Apparatus Div.; C. P. Fisher, Jr., manager, exhibit train division; and J. S. Smith, manager, advertising and sales promotion divisions.

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Headquarters for
COMPLETE
RAIL BOND SERVICE

Type M8-P
All-Purpose Bond

Consider these advantages when you make MOSEBACH your Rail Bond headquarters:

1. 18 types of MESCOWELD Rail Bonds permit you to select the one best suited to your needs.
2. The patented Flashwelding process for attaching cable to terminal prevents oxidation at welded intersection and increases conductivity.
3. Immediate delivery of MESCOWELD Rail Bonds helps you avoid costly shutdowns.

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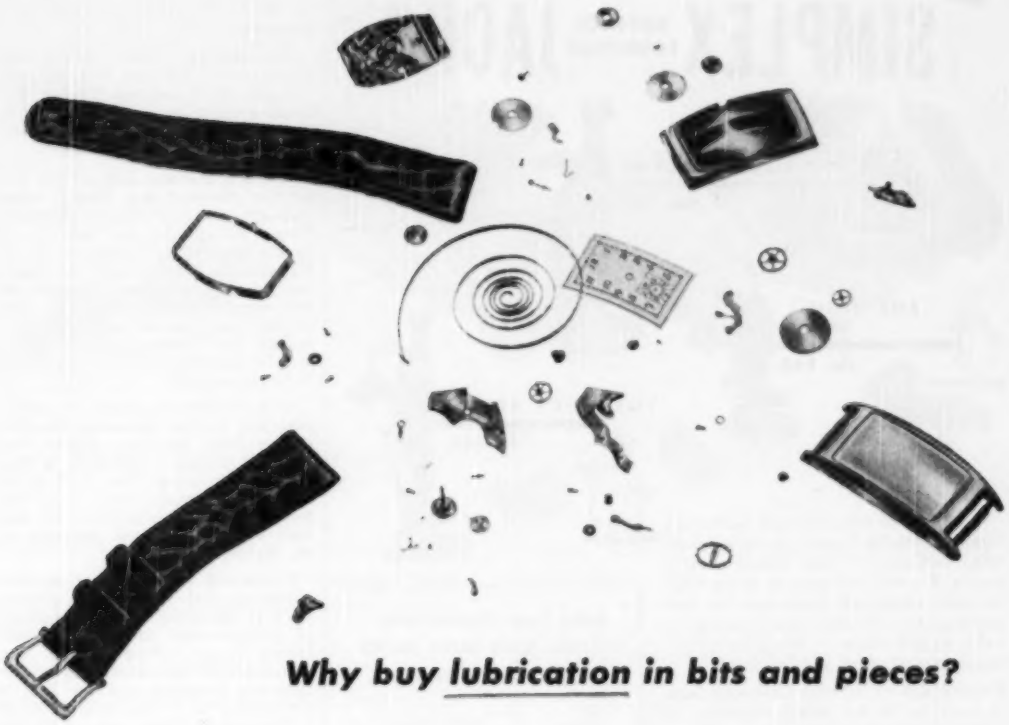
**R. G. Gehlsen** has been named sales manager, Mines Equipment Div., Joy Mfg. Co. Following several years as electrical superintendent of various coal-mining operations, Mr. Gehlsen joined Mines Equipment Div. in 1945 as a development engineer and served as manager, mining sales, from 1947 until his new appointment.

**The Erie Mfg. Co.**, Erie, Pa., has named R. A. Roosevelt sales manager, replacing George R. Wellmon, resigned. In his new position, Mr. Roosevelt, for the past 3 yr advertising manager of the firm, will direct both sales and advertising. The company also has appointed the O'Brien Industrial Equipment Co., 1295 Folsom St., San Francisco, a sales representative.

**George A. Dauphinais** has been named works manager of the Quaker Rubber Corp., Philadelphia, a newly acquired division of H. K. Porter Co., Inc., Pittsburgh. Mr. Dauphinais formerly was plant manager of the Porter company's 49th St. Pittsburgh plant.

**J. V. Doll** has joined Mack-International Motor Truck Corp., New York, as vice president, fleet sales, and as special assistant to H. W. Dodge, executive vice president. Mr. Doll has

# YOU WOULDN'T BUY A WATCH THIS WAY...



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Correct Lubrication is a lot more than just drops of oil and dabs of grease.

It's knowledge of your machines and their exact lubrication needs. It's the *right* lubricant, applied the *right* way. It's engineering service that helps you create one unified lubrication program throughout your plant.

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1. A study of all your machine lubrication requirements.
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SIMPLEX RATCHET LOWERING JACKS

● These rugged, easy operating Simplex Ratchet Lowering Jacks speed mine jacking . . . and insure greater safety. Proved and used in every type of mine, Simplex Jacks can be depended upon to step up efficiency; to cut time and costs on lifting, lowering, leveling and other jacking jobs.

Every Simplex Ratchet Lowering Jack is built to lift full rated capacity on cap or toe. Each guarantees maximum service with these features:

*Double lever sockets—Extra strong, adjustable spring mechanism—Shorter Fulcrum centers—Large Trunnion bearings—Reinforced, inner-ribbed housings.*

**No. 86A—FOR THICK SEAMS**
9 Tons capacity—20" high—12" lift. For coal cutting and loading machines, reralling mine cars and light locomotives, shop, track work, etc.

**No. 85A—FOR MEDIUM SEAMS**
9 Tons capacity—17" high—10" lift. For locations where more limited height and lift are required. Combines maximum strength with minimum weight.

**No. 84A—FOR THIN SEAMS**
9 Tons capacity—Weighs only 26 lbs.—14" high—7" lift. For easy handling and operation in cramped quarters.

**THE COMPLETE SIMPLEX LINE of MINE JACKS**
also includes—Mine Timber Jacks, Post Pullers, Hydraulic Jacks, Geared Jacks, and Anchor Jacks. *Send for Bulletin: Mines 47 and Mines 48*

***Safer Roof Control with***
**SIMPLEX MINE ROOF JACKS**

**Three Types of Heads**

"FS" Flat Swivel for use with wooden pieces—as shown on jack at left.
"C" for square and round timbers.
"FF" for small H beams and rails.

**SIMPLEX PIN-UP JACKS**
Type "FL" Head—flat with lugs.

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LEVER · SCREW · HYDRAULIC
Jacks

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been associated with the Texas Co. for the past 20 yr as manager of its national sales division.

**Chemical Plants Div., Blaw-Knox Co.**, Pittsburgh, has named Donald W. Beery senior engineer in its recently organized synthetic fuels and chemicals department. Mr. Beery joined Blaw-Knox late in 1948 after 10 yr of technical experience in chemical processing.

**Harnischfeger Corp.**, Milwaukee, has appointed Melvin O. Monsler sales manager of its welding division. Mr. Monsler has been associated with P&H for 12 yr, serving for 4 yr as assistant sales manager of that division.

**Harold J. Newton** resigned March 1 as vice president and general sales manager, National Electric Products Corp., Pittsburgh, for reasons of health, after 38 yr in sales work for National Electric products. Mr. Newton was appointed sales manager of the corporation in 1943 and was elected vice president and a director in 1948. The company's sales program is to be supervised by W. C. Robinson Jr., vice president.

**O. S. Dollison**, formerly vice president and general manager, Republic Rubber Div., has been elected vice president of the Lee Rubber & Tire Corp., Youngstown, Ohio. E. M. Ikirt, formerly assistant treasurer of the company's Republic Rubber Div., has been appointed general manager of the division.

**Continuing a program** of postwar expansion that is reported to have made it the nation's largest producer of prefabricated housing, National Homes Corp., Lafayette, Ind., was scheduled to begin additional manufacturing operations in a new plant at Horseheads, N. Y., near Elmira, April 1. The new facilities, totaling 175,000 sq ft of space leased from Webster Industries, Inc., will operate virtually independent of the Lafayette Works and will serve customers in the central- and north-east area with delivery of homes by truck. Facilities of the Lafayette plant also are to be enlarged, to increase daily output from 30 to 40 homes.

**Caterpillar Tractor Co.**, Peoria, Ill., has acquired approximately 300 acres of unimproved land near Joliet, Ill., on which it will immediately start construction of a new factory for manufacture of a large portion of its line of bulldozers, scrapers, wagons and rippers. Involving an estimated expenditure of several million dollars, the new plant is expected to achieve large-scale economies. The manufacturing facilities will cover approximately 700,000 sq ft of floor space and it is estimated that 1,200 to 1,300 people ultimately will be employed. T. R. Farley, vice president, with more than 30 yr of experience in the manufacturing and merchandising of Caterpillar products, will become general manager of the new Joliet plant.

# ...for Lower-per-Yard Tooth Cost

**Faster Digging** and lower tooth cost result when you put *ESCO* renewable box-type points and adapters on the business end of your buckets. Here's why—

**Resist Wear and Shock.** These teeth are made of *ESCO* Alloy 12M, a tough, heat treated steel made especially for resisting both wear and shock of digging. Cutting edge of each point is flame hardened so that it is approximately twice as hard as the rest of the tooth.

**Self-Sharpening Design.** As the point wears down, it remains sharp, gives clean bite with minimum resistance.

**Adapter Takes Strain of Digging.** Because of perfect fit of points to adapter, the key is a locking device only. All shock and strain of digging are absorbed by the adapter. Key is held in place by a live rubber plug.

**Points Quickly Replaced.** Using only hammer and drift pin, four points can be changed on the job in less than five minutes.

**Minimum Tooth Inventory.** Operators have found it both possible and desirable to use the same tooth on different sizes of dippers and buckets, reducing the number and types of teeth maintained in stock.

To get detailed information on these work-proved teeth, see your nearest *ESCO* representative, or use the coupon below.

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There are more Trabon automatic systems in operation than all other makes. Order a Trabon system today for reduced maintenance costs and better tonnage flow on your operation.

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OIL AND GREASE SYSTEMS

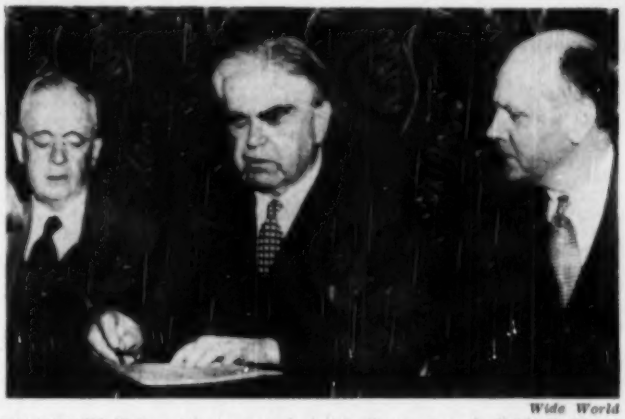
**TRABON ENGINEERING CORPORATION**
**1814 East 40th Street • Cleveland 3, Ohio**

# Miners Return Under New Contract As Truman Urges Coal-Industry Study

BITUMINOUS MINERS BEGAN filing back to work March 6 following formal signing of a new wage agreement the day before. A quick return to normal shaped up in the coal fields and allied industries as the danger of nation-wide paralysis waned. Principal coal negotiators hailed the new pact as an opportunity for the coal industry to stabilize itself.

The contract, ratified by the UMWA Policy Committee and accepted by representatives of northern, western, southern and "captive" mine owners, was at last worked out in principle March 4 in a brief but private talk between George H. Love, president, Pittsburgh Consolidation Coal Co., and John L. Lewis, UMWA president, after the union had been freed of contempt-of-court charges and after President Truman had asked authority to seize the mines.

Within a few days, on March 8, UMWA and anthracite representatives agreed on similar terms to become effective March 16. Anthracite miners, who had been working only three days a week, immediately resumed a full work schedule. PMWA miners in Illinois, who had been on strike for some two weeks, also returned to the mines under a similar contract. Bituminous operators who had signed the earlier "Kentucky" agreement, which provided more generous terms for miners than the new contract, were permitted to modify their terms in line with the bulk of the industry.



*Wide World*

COAL DISPUTES END as John L. Lewis, flanked by Thomas Kennedy (left), UMWA vice president, and George H. Love (right), principal operator negotiator, signs new agreement. Anthracite pact followed three days later.

## Both Sides Make Gains; Welfare Clauses Changed

The new bituminous agreement reflected substantial concessions by UMWA and operator representatives. Miners won a wage increase of 70c per day, running the basic daily wage up to $14.75, and an additional 10c per ton for the welfare-and-retirement fund, making a total levy of 30c per ton. That was short of the 95c per day and 15c per ton Mr. Lewis is reported to have asked for. The operators, on their side, won abandonment of the "able and willing" clause and a limit of five days per year on "memorial" stoppages. By inference, the union gained control of the welfare fund and therefore complete responsibility for its operations. The operators agreed to withdraw suits they had filed against the union in several courts. The new pact will run until June 30, 1952, but may be reopened upon notice after March 31, 1951.

Welfare clauses in the bituminous contract name Charles A. Owen, chairman of the board, Imperial Coal Corp., as the operators' trustee. Miss Josephine Roche, former administrator of the fund, moves up into a trustee's seat as a "neutral" representative. Mr. Lewis, as before, represents the miners. The agreement provides that employees other than members of the UMWA may become eligible for benefits.

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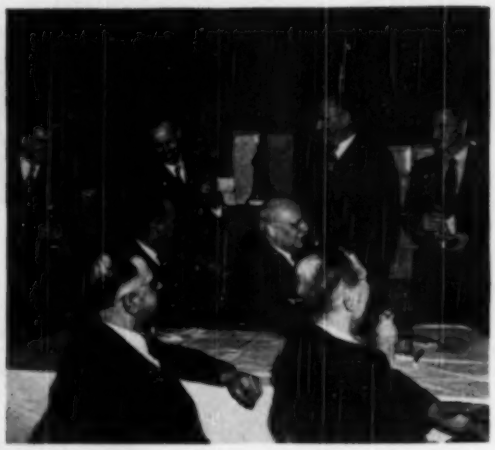
## Stocks Hit Low Point; Industries, Schools Hurt

A rapid-fire series of events preceded agreement on back-to-work terms. With coal stockpiles shrunk by three-day weeks and full stoppages extending back to early spring, 1949, railroads at the time of the signing were under orders to curb coal-burning freight movements 40% and passenger trains 60%. Big cities and smaller towns had invoked brownouts, a score of steel-industry blast furnaces and open hearths had cooled

(*Continued on page* 170)



**KEY SUPERVISORS receive safety trophies to mark 1949 achievements as . . .**

# Armco Fetes Safety Champs

SOME 150 EMPLOYEES AND GUESTS of the Armco Steel Corp., Mining Div., attended a banquet Jan. 28 at the Marsh Fork High School, Montcoal, W. Va., to honor the supervisors and men of the Hernshaw mine, Montcoal tipple and Montcoal maintenance, winners of the division's annual safety contest.

The winning group, which had the best accident-frequency rating among the five groups competing, had only one major accident in working a total of 229,117 man-hours during 1949, or a rate of 4.36 per million man-hours. Hernshaw mine had not had a fatality since Nov. 24, 1944, mining approximately 1,000,000 tons during that period. The 1949 accident-frequency rate for all the division's mines marked a new low of 13.91 per million man-hours. The winning group in the company's contest had a rate of 16.31 in 1948, and a rate of 19.60 in 1947.

Ceremonies during the evening included presentation (left photo) by L. F. Reinartz, assistant vice president, of a safety plaque to the winning group, represented by A. E. Oakley (left), superintendent, Montcoal-Stickney operations. Supervisors and mine safety committeeman receiving replicas of the Armco Iron Man Safety Trophy (right photo) are: Harold Feazelle (left), preparation engineer; Paul Carter, superintendent of maintenance; French Yoder, general mine foreman, Hernshaw mine; and Marvin Marshall, safety-committee chairman. Other officials (seated) are: C. O. Kane, general superintendent, Mining Div.; Mr. Reinartz; H. L. Schweinberg, W. Va. state mine inspector; and Charles Milligan, W. Va. inspector-at-large. In appreciation of their interest and efforts in achieving the 1949 record, individual members of the group received mementoes.

## Personal Notes

**William R. Cuthbert**, resigned as chief engineer, The Valley Camp Coal Co., Elm Grove, W. Va., to become chief engineer for the West Virginia operations of the Truax-Traer Coal Co., Kayford, W. Va., effective March 15.

**E. M. Pace**, formerly with the engineering department, Inland Steel Co., Wheelwright, Ky., has been named superintendent of the company's new central cleaning plant at Price, Ky. **R. A. Jiminez**, also of the engineering department, has been put in charge of the coal-testing laboratory at the new central cleaning plant.

**Roland P. Price** has been elected vice president, Fourseam Coal Corp., Bramwell, W. Va. Mr. Price also is general manager, P. & D. Coal Co., Whitesburg, Ky.

**J. A. Burns**, for some years superintendent, Redyard Coal Co., Pineville, W. Va., has resigned. Beyond a vacation of several months, Mr. Burns' plans have not yet been announced.

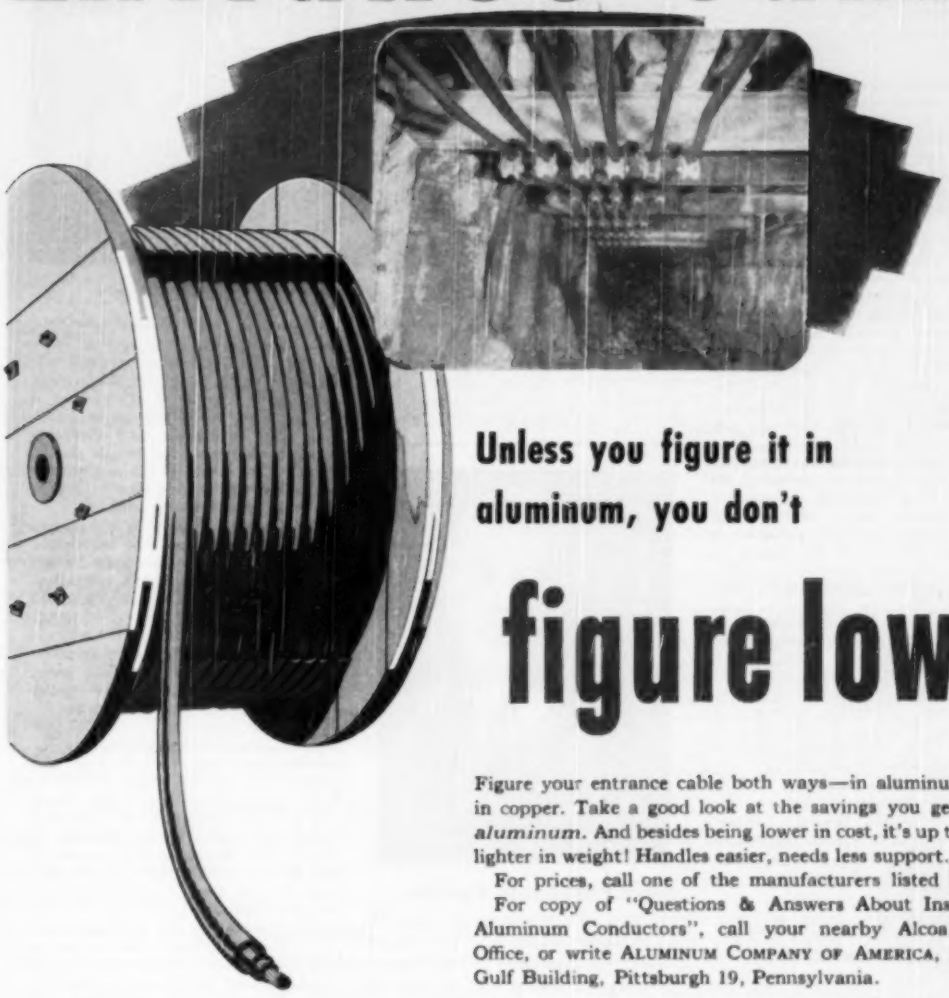
**William R. Campbell**, Lackey, Ky., has been named a Kentucky state district mine inspector, for a 4-yr term. **James H. Phalan**, Earlington, Ky., has been appointed an inspector of mine weights, also for a 4-yr term.

**T. L. Kemp Jr.** has been transferred to Mine No. 15, West Virginia Coal & Coke Corp., Stirrat, W. Va., as assistant superintendent. Mr. Kemp formerly was at Mines Nos. 19 and 5

## Burchfield Retires

C. B. BURCHFIELD, associated with the Black Star Coal Corp., Alva, Ky., for more than 43 yr, retired Feb. 1 as general manager of mines for the company. Mr. Burchfield has been prominent in industry activities in the region for many years and during 1949 was president of the Kentucky Mining Institute. He also was one of the founders of the Cumberland Valley Mining Institute and has served as its president. In addition, he has been active in many civic and fraternal organizations, the Masonic Lodge at Alva having been named in his honor. Robert Nichols has been named to take charge of the company's operations at Alva, succeeding Mr. Burchfield.

# Entrance Cable



**Unless you figure it in aluminum, you don't**

# figure low

Figure your entrance cable both ways—in aluminum and in copper. Take a good look at the savings you get with *aluminum*. And besides being lower in cost, it's up to 50% lighter in weight! Handles easier, needs less support.

For prices, call one of the manufacturers listed below.

For copy of "Questions & Answers About Insulated Aluminum Conductors", call your nearby Alcoa Sales Office, or write ALUMINUM COMPANY OF AMERICA, 1787D Gulf Building, Pittsburgh 19, Pennsylvania.

*Insulated* **Aluminum Conductors**

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- Anaconda Wire & Cable Company
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- General Cable Corporation
- The Okonite Company
- United States Rubber Company

in various supervisory capacities. **Arthur Cohenhour**, electrician at Mine No. 15, has been promoted to chief electrician at that mine, succeeding **O. A. Peters**, resigned.

**William P. Smith**, formerly mine inspector, has been appointed night mine foreman, No. 1 mine, Ebensburg Coal Co., Colver, Pa.

**Creed Kelley**, Big Stone Gap, Va., has been appointed a Virginia mine inspector.

**John A. Williams**, formerly section foreman, Olyphant colliery, The Hudson Coal Co., Scranton, Pa., was recently promoted to assistant rock foreman and placed in charge of rock-development work in all collieries in the Lackawanna County section of the company.

Several changes in supervisory officials have been announced by Eastern Gas & Fuel Associates. **W. W. Hunter**, formerly superintendent, Stotesbury No. 8 mine, Stotesbury, W. Va., has been named general superintendent of the company's Fayette County mines, which include Powellton Nos. 3 and 6, Midvale and Beards Fork. Succeeding Mr. Hunter at Stotesbury is **Clarence O. Carman**, formerly general mine foreman. **Frederick A. Ritch**, assistant mine foreman, has been made general mine foreman, replacing Mr. Carman. **Evan Maynard**, section foreman at Helen No. 9, has been appointed assistant mine foreman at Stotesbury No. 8. **H. W. Moore** has been named superintendent, Powellton No. 3 mine, Elkridge, W. Va.

**J. W. Wood** has been appointed chief electrician, Helen mine, Eastern Gas & Fuel Associates, Helen, W. Va., succeeding **C. M. Crews**, retired. **Hubert Hensen** has been promoted from machineman to section foreman. At the Kopperston No. 1 mine, Kopperston, W. Va., **Joe Lundy**, formerly loading-machine operator, has been advanced to slate foreman. The following men have been named section foremen: **Shelby Brown**, formerly bratticeman; **Avil Gross**, cutting-machine helper; **F. C. Maynard**; and **Frank Davis**.

## Norfolk & Western Buys 30 C. & O. Switchers

The Norfolk & Western Ry. announced March 10 that it had purchased 30 coal-burning switchers from the C. & O., which has turned to diesels for switching. While no price was announced, the engines were sold at "bargain-basement" prices, it was reported.

In reporting the deal, the N. & W. said: "By this purchase, the Norfolk & Western reasserted its confidence in the future of coal-burning locomotives." The engines had been built by the Baldwin Locomotive Works for the C. & O. in 1948, before it decided to change to diesels for switching.

## New Laboratories Serve French Coal Industry

Including 26 buildings and complete facilities for all types of mine, coal and market research, construction of new laboratories has recently been completed by the coal industry of France. The laboratories are located at Verneuil, approximately 40 mi north of Paris. The property, comprising more than 100 acres with additional ground available for expansion, is on top of a plateau in a wooded area to permit experiments with mine explosives and chemicals without disturbing the people in the vicinity. The slopes of the plateau are very steep, facilitating work in quarry and underground entry problems.

Eight of the 26 buildings house part of the personnel. The laboratory buildings are few and large rather than small and specialized, specialization being practiced in only a broad way to permit a large degree of versatility in research. The main buildings are: staff and administration, chemistry and physics, pilot-plant tests, fuel utilization, mine safety (three buildings) and an explosion tunnel.

The new laboratories will be the scene of part of the meetings of the international coal conference on coal preparation to be held in Paris, France, June 24-29 (*Coal Age*, January, p 146). Organized by Charbonnages de France, which operates all French coal mines, and sponsored by the French government, the conference will have as its theme the recent developments (1940-1950) in coal-preparation theory and technical progress. Topics include: evaluation of washing results, methods of checking washing-plant performance with results of actual tests, equipment improvements and new methods, auxiliary preparation operations, and flowsheets and general washing-plant arrangement.

Chairman of the committee on arrangements is Etienne Audibert, chairman of the board of directors of Charbonnages de France. The national bureaus of mines of the participating countries are invited to be represented on the committee. As June is the height of the tourist season, those expecting to attend are urged to make hotel reservations early.

## Joins Pittsburgh Consol

HENRY F. HEBLEY, director of research for the Pittsburgh Coal Co. since 1939, has been named research consultant for the Pittsburgh Consolidation Coal Co. In his new post, Mr. Hebley will coordinate the company's activities in the control of air and stream pollution, cooperating with both government and civic authorities in these fields. The company made the appointment in recognition of the growing public interest in the problems of pollution. Mr. Hebley also serves as the representative of the Western Pennsylvania Coal Operators' Association, which is cooperating with the Mellon Institute, Pennsylvania State College and the state Chamber of Commerce in pollution-control projects.

# IT COSTS NO MORE TO HAVE THIS PROTECTION AT YOUR MINE . . . .

## HAZAPRENE ZBF* SHEATH

**Unequalled for Flame-Resistance — standard on all Hazacord Portable Mining Cables**

**HAZACORD Mining Machine Cables** — fine copper wires, Hazaloy coated or tin-coated for corrosion protection, provide a flexible, easy-to-handle cable. Long-lived, heat-resisting, Parformite insulation over the conductors has an operating temperature of 75 C. This provides a safety margin of about 25% to withstand overload surges. Hazoprene fillers (not jute) are used to prevent wicking in of moisture through cable ends. Available is Twin-Parallel, Concentric or Two Conductor Round Types.

### *ZBF ZINC BORATE FORMULA

Flame tests have shown that Zinc Borate imparts greatly increased fire-resistant properties to neoprene compounds with burning rates reduced by as much as 20% and weight losses by as much as 40%. Afterglow is materially reduced also. Millions of feet of cable protected by this type of sheath were used during the war by the Navy for special operating conditions to gain extra fire protection. Hazaprene ZBF Sheaths mean not only greater safety because of unusual flame-resistance and lack of afterglow — but also longer life through increased resistance to abrasion, wear and tear.

IN more and more mines every day, electrical men are turning to Hazacords to gain the extra safety provided by the Hazaprene ZBF Sheath. This basic improvement developed by Hazard in neoprene sheaths has all the qualities important to long cable life — oil, water, acid and heat resistance, good flexibility combined with enduring toughness — *plus a resistance to flame never before obtainable.*

And under this Hazaprene ZBF Sheath, you'll find each Hazacord Mining Cable has its individual service-engineered features to assure — from every cable component — safe, trouble-free operation. For complete information, ask your Hazard representative or write Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.

TYPE SH-A

**HAZACORD Shovel and Dredge Cable** — three separate conductors are individually protected with heat-resisting Keystone insulation and color-coded for quick, lasting identification. They are cabled together with Hazaprene fillers for extra flexibility and moisture tightness. A reinforced double layer Hazaprene ZBF Sheath provides over all protection, and, like all Hazaprene ZBF Sheaths, is pressure cured in a continuous metal mold for increased density and long life. Available in Types G, W, and Type SH, which has four different styles to best meet voltage pressures and operating conditions.

**HAZACORD Flexible Cords** (rated at 600 volts) for hand-held mine drills are protected with this tough, durable Hazaprene ZBF Sheath that withstands the most severe service. Hazacord's safety features have earned approval by law for underground mine use. Each is marked with Pennsylvania Dept. of Mines Approval P104 and more than meets their high standard of flame-resistance. Hazacords are also available in Type SO and SJO to meet every mining need for portable tools, appliances, drop lights, etc.

**HAZARD**

7474

**insulated wires and cables for every mining use**

**MUTUAL EFFORTS in promoting safety the theme of union and company officials as . . .**

# Red Jacket Stresses Labor-Management Cooperation

WORKER - MANAGEMENT COOPERATION in achieving greater mine safety was the keynote of the 4th annual labor-management dinner of the Red Jacket Coal Corp., held Feb. 4 at the Mountaineer Hotel, Williamson, W. Va. In talks before the group, international, district and local union officials joined company officials in stressing mutual interest and efforts as the basis of continued safety improvement.

Many compliments were tendered the company on the success of its safety program, its emphasis on safe operation and the sincere attitude of management officials. Company officials, in turn, gave full credit to the mineworkers and their officials for their cooperation and work in making the program a success. "It is true that we want production but we must not lose sight of the fact that safety is paramount," said Paul D. Ritter, Red Jacket president, in emphasizing the company's basic policy. "This safety record cannot be achieved by any one of us alone and each year it will be more difficult to make improvements, therefore our cooperation and efforts must increase."

R. A. Ison, assistant general manager, opened the meeting and introduced Charles Kiser, representative, District 17, UMWA, who served as toastmaster for the evening. Following remarks by J. J. Plasky, company training and safety director, the heads of each Red Jacket local were introduced and in turn presented their fellow union officials. Other speakers included C. F. Davis, director, safety division, UMWA; A. U. Miller, supervising engineer, USBM; George Griffith, secretary-treasurer, District 28, UMWA; and William M. Ritter, Red Jacket general manager. Guests of the company included J. J. Ardigo, secretary, Williamson Coal Operators' Association; J. T. Whalen, Lex Trunko and A. L. Ulshafer, coal mine inspectors, USBM; and Gus Allison and Ransom Kirk, field representatives, District 17, UMWA.

## Operators View B. & O. Home-Fuel Traveling Coal Exhibit

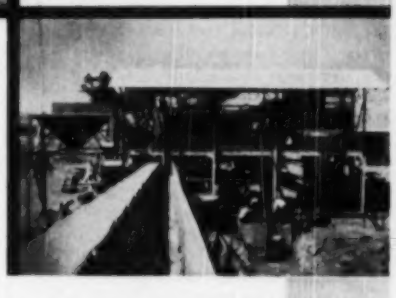
MORE THAN 60 bituminous coal producers from West Virginia are shown as they gathered in Baltimore Feb. 28 to inspect the Baltimore & Ohio's "Traveling Coal Exhibit," designed to help bituminous coal win a larger share of the home-fuel market. On the following day, the exhibit was visited by officials of NCA, BCR, BCI, Coal Heating Service, American Coal Sales Association and the Baltimore Coal Exchange.

The exhibit was to be open to the public in Baltimore for a week, after which it was scheduled to be displayed for a week in each of five Ohio cities and then to go on to other cities to be announced. The exhibit had been first displayed in Chicago the week before, with some 300 retail dealers attending the opening.

A wide variety of modern domestic-heating and stoker equipment designed to burn bituminous coal with a minimum of smoke, trouble and expense is included in the exhibit. Retail dealers in each city will be especially invited to view the sales ammunition it provides them for dealing with their customers.

"This effort to help the retail coal dealer in his competition with oil and gas is evidence of the B. & O.'s faith in the future of the bituminous coal industry," said Clark M. Groninger, manager of coal traffic. "Despite the competition from other fuels, most of

## would YOU build an automobile on a mountainside?



### no!

You'd build it in a factory where the necessary tools, materials and engineering assistance were available for low cost quantity production.

**MOBIL-MILLS** are likewise factory built. They are complete Heavy Media plants prefabricated for quick, low cost field assembly anywhere in the world.

- **Installed in 7 days** by Wemco's own engineers and crews, MOBIL-MILLS are complete in every detail—machinery, wiring, piping, stairways and walkways—all components required for immediate operation.
- **Initial cost is low** because MOBIL-MILLS are prefabricated plants, eliminating expensive on-site construction and extensive engineering supervision.
- **Exceptionally clean coal is produced** for which buyers pay premium prices. These Heavy Media plants handle even the toughest coal cleaning problems efficiently and economically—backed by 10,000,000 annual tons of MOBIL-MILL capacity already in operation.

**MOBIL-MILLS** are available in capacities from 25 to 420 tons per hour. Larger sizes are built to order.

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# CAN'T MISS!

**AMERICAN COUPLERS WILL LOCK OR LOCK-SET ONLY WHEN TWO HEADS ARE TIGHT TOGETHER**

**SAFETY, SPEED, INFALLIBILITY!** See how these modern *musts* have been engineered into American Mine Car Couplers. There's no risk of damage or delay. *Any* two heads will couple—and they're always *ready* to couple. Uncoupled heads *can't* be locked!

**BUILT TO LAST.** American's exclusive *nose-and-pocket* head design has many outstanding advantages. It protects the locking parts; has *extra-wide* gathering range. Locks engage with a tight grip; prevent slack and costly wear. Pull is transmitted through cast-steel contacts —*not* through the pivot pins. Sturdy full-length flanges take all buffing *without* side pressure.

**RIGHT FOR YOU.** American Couplers are self-centering, self-leveling; *won't "jackknife."* They unlock from either side without stepping between cars; rotary-dump without uncoupling. Made in swiveling and non-swiveling types and with attachments for locomotives. For faster, *safer* mine car movement, investigate the many money-saving features of these modern *all-service* couplers.

*Facts Free*

Write for this new illustrated booklet. It gives all the facts you'll want to have handy on these better, safer couplers. Built by the world's largest producers of cast steel—pioneers in the development and manufacture of automatic couplers. Mailed free!

LOCKS HERE
LOCKS HERE
Won't Creep or Jar Open
As pivoted locks swing into engagement, each control bar drops to lock against the flange of opposite head.
LOCK-SET
Lifting and pulling either control bar unlocks the coupler and holds lock in lock-set position until heads move apart.

# Safe...Sure AMERICAN MINE CAR COUPLERS

**AMERICAN STEEL FOUNDRIES, 410 N. MICHIGAN AVE., CHICAGO 11, ILL.**


## MEETINGS

- American Society of Mechanical Engineers: spring meeting, April 12-14, Hotel Statler, Washington, D. C.
- Canadian Institute of Mining and Metallurgy: annual meeting, April 17-19, Royal York Hotel, Toronto, Ont., Can.
- American Mining Congress: coal convention, April 24-26, Netherland Plaza Hotel, Cincinnati, Ohio.
- Midwestern Retail Coal Association: annual meeting, May 15-16, Savery Hotel, Des Moines, Iowa.
- Virginia Coal Operators' Association: annual meeting, May 18, Norton, Va.
- Canadian Retail Coal Association: annual meeting, May 22-23, King Edward Hotel, Toronto, Ont., Can.
- Mine Inspectors' Institute of America: 40th annual convention, June 5-7, Hotel Prichard, Huntington, W. Va.
- Stoker Mfrs. Association: annual meeting, June 13, LaSalle Hotel, Chicago.
- American Retail Coal Association: annual meeting, June 13-14, St. Louis, Mo.
- Rocky Mountain Coal Mining Institute: annual meeting, June 19-21, Hotel Colorado, Glenwood Springs, Colo.

the homes in the United States still are heated by coal, and the domestic fuel market constitutes a large and important segment of the bituminous-coal market as a whole.

"Recently developed types of coal-burning heaters and furnaces, as well as automatic stokers and automatic temperature controls, make bituminous coal a cheap and efficient fuel for home-heating purposes. In addition, in the design of these new types of home furnaces particular attention has been given to making coal a clean-burning fuel," Mr. Groninger emphasized.

## Obituaries

**Walter A. Bledsoe,** 74, president, Walter Bledsoe & Co., Terre Haute, Ind., and affiliated companies, died March 1 in Miami Beach, Fla., where he had gone two weeks previously to recuperate from a heart attack. Mr. Bledsoe first became associated with the coal industry in 1896, when he joined the Pittsburgh Coal & Coke Co. as a wholesale salesman. His company owns and operates coal-mining companies in four states and, in addition, acts as sales agents for a

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*Sensational*

**NEW CAR UNLOADING TEAM!**

***unloads car of rock or crushed stone in 45 minutes***

**358 B-G HOPPER CAR UNLOADER**

Here's a rugged all-material unloader that's completely new in design. The 358 cuts hopper car unloading time as much as 90%—unloads most any bulk product from fine sandy material to large-sized rock aggregates at capacities up to 3 tons per minute—empties a 60-ton car in as little as 45 minutes without jam-ups or delays. There's *positive material flow at all times.* Easily "spotted" in track pit or above rails—really portable—can be towed at normal traffic speeds.

**363 B-G PORTABLE CONVEYOR**

The newly designed B-G Model 363 Portable Conveyor is an extremely flexible machine that will prove to be profitable to yards, industrial plants, contractors, etc. Speeds up stockpiling or transfer of material from car or stock pile to trucks. Entirely new in design, the 363 features V belt drives, pneumatic tires, shock absorbers, towing hitch, and a host of new improvements. Send for new attractive literature on these two great B-G machines.

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LOADERS PERMANENT CONVEYORS PORTABLE CONVEYORS COAL MACHINES BITUMINOUS PLANTS FINISHERS DITCHERS

# CONTROL COAL DUST with Pangborn Dust Control

**PANGBORN Dust Control Equipment gives you:**

- **efficient coal dust disposal and reclamation**
- **increased safety**
- **improved working conditions**
- **lower equipment maintenance cost**
- **decreased dust nuisance**

In scores of coal preparation plants, Pangborn Dust Control installations have paid off over and over again by improving working conditions, eliminating dust nuisances, cutting maintenance costs, doing a superior job of dust disposal and reclamation. By effectively collecting the fine coal dust produced in the operation of tipples, dry cleaning, de-dusting and other preparation facilities, Pangborn has become a by-word for making profit-stealing coal dust *behave*.

Whatever your dust problem—high machinery maintenance, nuisance, lost profits through faulty reclamation—Pangborn engineers can help you with an economical and effective solution. Let us make a *dust pocket survey* for you. No obligation—but with the information it gives us, we can recommend the right Pangborn Dust Control Equipment to rid your plant of dust hazards and nuisances.

Write for Bulletin 909A, "The Control of Industrial Dust." PANGBORN CORPORATION, 288 Pangborn Blvd., Hagerstown, Md.

*Look to Pangborn for all the latest developments in Dust Control and Blast Cleaning Equipment.*

**THE DUST HOG**

**from stealing profits with**

**Pangborn**

**DUST CONTROL**


## EQUIPMENT APPROVALS

Two approvals of permissible equipment were issued by the U. S. Bureau of Mines in February, as follows:

Long Super Mine Car Co.—Type 15 hp conveyor power unit; one motor, 15 hp, 230 v, dc; Approval 2-717; Feb. 8.

Huwood-Irwin Corp.—Types HIF, HIL and HIT chain conveyors; one motor, 5 hp, 230 v, dc; Approval 2-718; Feb. 20.

number of other producing companies. Mr. Bledsoe also was a director of several other coal and business organizations.

**D. R. Jones**, 56, mine foreman, Dixiana mine, Coal Processing Corp., Notron, Va., died March 6 at a Norton hospital.

## Large Attendance Seen At AMC Convention

Some 1,500 to 2,000 coal-mining men and representatives of allied equipment manufacturers are expected to attend the three-day Coal Convention of the American Mining Congress, to be held in Cincinnati, April 24-26.

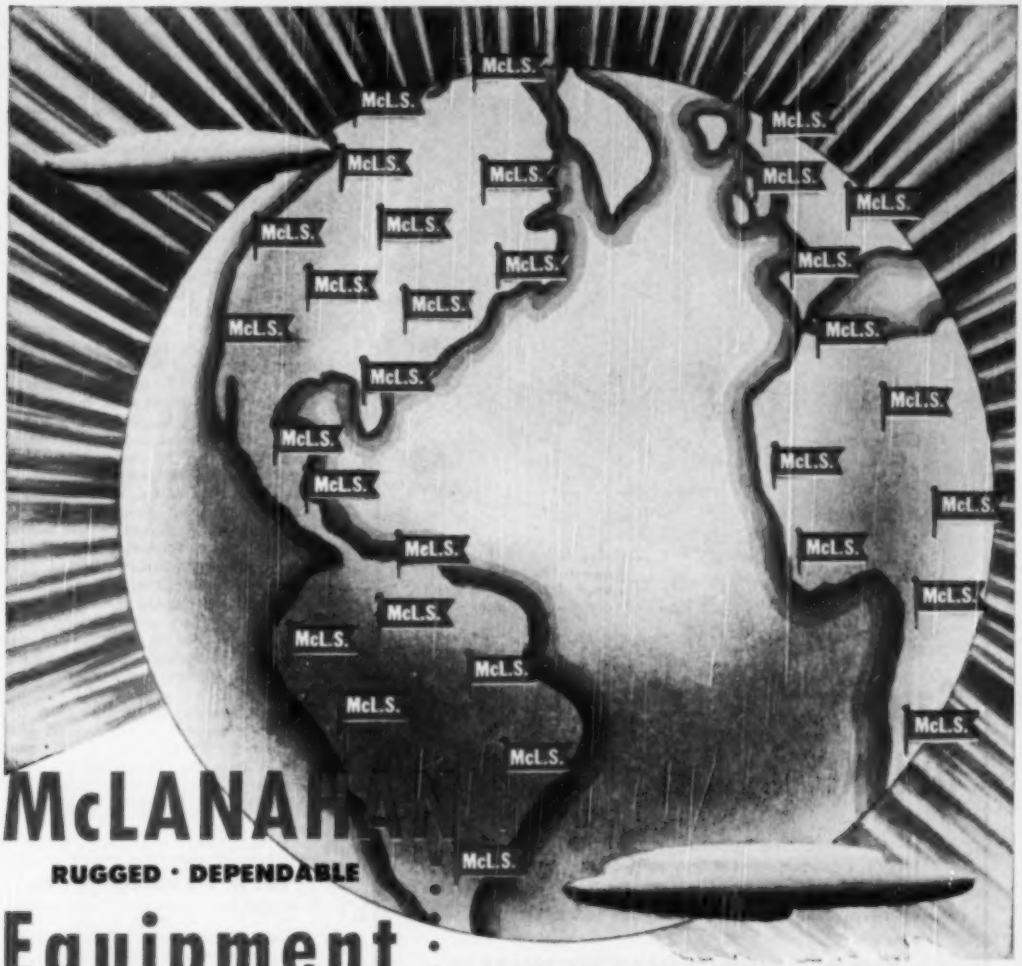
Highlighted on the extensive program previously announced *(Coal Age*, March, p 158) are such important problems as improved public relations; educational programs to develop supervisory personnel; mine safety, with particular emphasis on reduction of mine accidents; pension plans for coal-company employees; improved methods of preparing coal for market; mine roof bolting; stripping; mine haulage; power use; and operation with continuous-mining machines.

A special luncheon session on Tuesday, April 25, will have as the featured speaker, Louis B. Seltzer, editor, *Cleveland Press*, who will talk on "The Biggest Threat to American Business," according to a recent announcement.

## Active Research Planned For Anthracite Laboratory

Active research in conservation, efficient mining, improved preparation and new uses for anthracite is the prime mission of the staff of engineers now assembling at the Bureau of Mines' new anthracite research laboratory at Schuylkill Haven, Pa. Authorized by Congress in 1942 and recently completed on a $450,000 federal appropriation, the laboratory will serve as headquarters for the anthracite sub-region of USBM Region 8.

John W. Buch, chief of the anthracite sub-region, is directing the work

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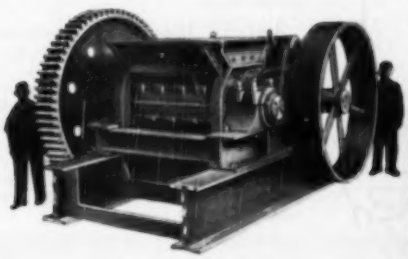
# Equipment

**. . . SERVING ECONOMICALLY IN WORLD-WIDE PIT, MINE OR QUARRY OPERATIONS**



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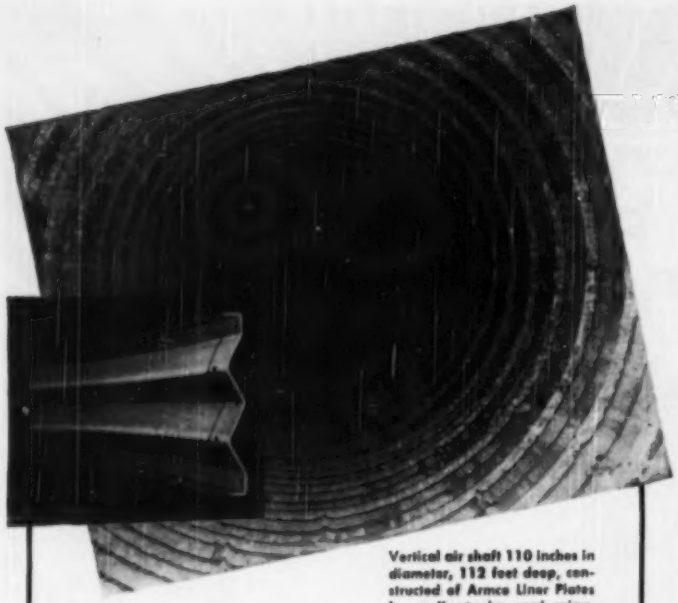

Vertical air shaft 110 inches in diameter, 112 feet deep, constructed of Armco Liner Plates for a Kentucky coal mine.

# Gain Fresh Air–Greater Safety QUICKLY and ECONOMICALLY

Here's a quick, low-cost way to provide ventilation and safety as your mine workings extend back from original openings. Simply use Armco Tunnel Liner Plates to sink new shafts.

Work moves surprisingly fast and labor costs are low. A single unskilled workman can carry, hold and bolt into place an Armco Liner Section. No special tools are required. Excavation is kept to a minimum.

Corrugated metal design gives Armco Plates plenty of strength. There is a size and gage to meet almost every need. Diameters range from 45¼ inches to 33 feet, gages from No. 14 to No. 3.

Use Armco Tunnel Liner Plates for sloped and vertical entries, overcasts, substations and escapeways. Write for complete information. Armco Drainage & Metal Products, Inc., 4270 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation. Export: The Armco International Corporation.

**ARMCO TUNNEL LINER PLATES**

ARMCO

of the laboratory staff, and will also supervise flood control, mine-fire control and roof-bolting investigations from the new facility. Mr. Buch is assisted by C. A. Landsidle, Schuylkill Haven, mechanical engineer and assistant laboratory supervisor; J. D. Clendenin, State College, Pa., supervisor of preparation and utilization research; Andrew Allen Jr. and Robert Ruff, Schuylkill Haven, mining engineers; William Sanner, Frackville, fuel engineer; and M. R. Price, Schuylkill Haven, building superintendent. The present staff of 21 will be expanded to 65 persons when the full program is under way, and full operation is expected within one year.

Design of the laboratory provides utmost flexibility, follows latest principles developed for scientific research in industrial laboratories in eastern United States, and provides for expanding the present floor area of more than 23,000 sq ft by nearly three times, if demands require. Chemical and coal-preparation laboratories, a photo laboratory, shop facilities, a fully automatic heating plant and a well-planned utilities-distributing system permit an intensive research program into many anthracite problems. Library, design room and office space are also provided, and a recent additional appropriation of $300,000 authorizes construction of a wing to accommodate other laboratories and offices.

The laboratory is situated on a 15-acre tract donated to the federal government by Philadelphia & Reading Coal & Iron Co., Pottsville, Pa., and Schuylkill County authorities, and overlooks U. S. Highway 122.

## New Developments

**Plans for opening** a new property with an eventual capacity of 1,750 to 2,000 tpd were reportedly announced last month by the Premier Pocahontas Coal Corp., Bluefield, W. Va. The new operation, which will mine a lease from the Pocahontas Land Co., is near Herndon, Wyoming County, W. Va., and eventually will employ 400 men, it is reported. The mine was expected to begin operation about May 1 and will be served by a short spur to be built by the Virginian Ry.

**Sunnyhill Mine No. 6,** Reedsville, W. Va., has been sold by the Sunnyhill Mining Co., Pittsburgh, Pa., to Paris Shay, Kingwood, W. Va., and Ed Boyle, Morgantown, and will be operated by the new owners as the Sandy Creek Coal Co. The sale included plant, coal lands, tipple and equipment. Present mine and tipple personnel will be retained, it was reported.

**The Diamond Coal Co.,** Atlas, Pa., is now in operation with completion of a new modern steel breaker

# Don't take your transmission for granted

*Plenty of horsepower—but nowhere to go . . .* Not until the transmission puts the horsepower to work. Even the most skilfull driver is helpless to get the most out of his engine and rig without the *right* gear ratios.

The *right* gear ratio for every expected, and unexpected, road and load condition—that's one of the most important problems in *balanced* truck operation. Horsepower alone can't solve it.

That's why it pays to specify Fuller Transmissions—and Fuller Auxiliaries. Then, you have the advantage of a *complete* range from which to choose.

Don't take your transmission for granted when your profit depends on getting there and back. Be sure, and specify Fuller geared-to-the-road-and-load heavy-duty Transmissions. Write today for literature to help you select the right transmission for your job.

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## Cuts Stuffing Box Maintenance...

**Fluctuating Sealing Water Pressure Is No Problem** when you install a Morris Type R Slurry Pump. Even when peak demand on the plant supply line lowers the pressure, this pump operates with minimum stuffing box wear. Only 10% normal sealing water pressure is actually required . . . because Morris Type R stuffing box is subject to *suction pressures only*. Low line pressure is therefore sufficient to shut out grit effectively . . . and still protect the slurry from objectionable dilution.

If no other Type R feature were listed, here's one that says: Specify Morris. But there's even a bigger story. Ask for further information on this outstanding slurry pump, servicing scores of material handling applications.

**OTHER MORRIS TYPE R FEATURES**

- ✓ EASY TO INSTALL
- ✓ EASY TO DISMANTLE
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- ✓ SIMPLEST DESIGN
- ✓ MINIMUM NUMBER OF WEARING PARTS

*Specify* MORRIS Type "R" SLURRY PUMP

MORRIS MACHINE WORKS
Baldwinsville, N. Y.
*Branch Offices in Principal Cities*

MORRIS *Centrifugal Pumps*


equipped with cone cleaning equipment to prepare all sizes of anthracite. The operation is located on the Pennsylvania R.R. and has a capacity of 2,000 tpd. A. L. Watson & Co., Inc., and Louis Gulotta & Co., Inc., are distributors for the company.

**All unmined coal** under a 200-acre tract in Snowden Township, Allegheny County, Pa., has been leased by Jones, Inc., Pittsburgh, Pa., to the Snowden Coal Co., Inc., also of Pittsburgh. Stripping operations have been begun on the property.

**A new Coal-hauling service,** Strip Mine Service, Inc., is expected to begin operations shortly at Colliers, W. Va. The company will act as a freight-transportation organization, hauling coal to local consumers. Incorporators are Fred Basnett, Audie H. Shriver and William Hundley Jr.

**Development of several truck mines,** with a total initial capacity of 800 to 1,000 tpd, by the Thomas Coal Co. No. 2, Inc., Manchester, Ky., was expected to get under way last month. The company, which will ship over the L. & N., was incorporated by Thomas Congleton, Frank Marcum and Daniel B. Brown. Plans for development this spring of some 50 truck mines in the Wooten's Creek section and along the Middle Fork River in Leslie County, Kentucky, also have been reported. Coal is to be trucked to Manchester, for shipment via the L. & N.

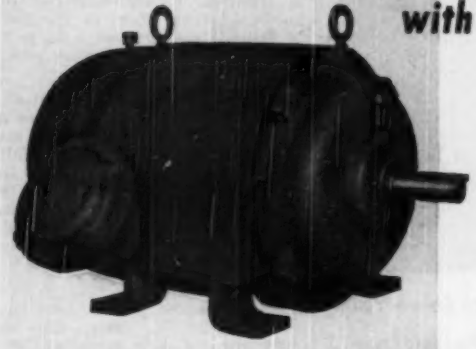
**A new truck mine** having a capacity of 800 to 1,000 tpd reportedly is being developed near Puncheon Fork, Kite, Ky., by O. M. Harlow, Neon, Ky., and associates. The mine will load over a new ramp being built by the Inland Steel Co. on the Beaver Creek Branch of the C. & O., which is expected to serve some 25 truck operations in the area.

**Ozark Philpott Mines,** a subsidiary of the Utah Construction Co., officially opened early this year its new modern strip mine in Johnson County, Arkansas. The mine has a capacity of 1,000 tpd and has 1½ million tons of coal available for development. L. C. Corey is president; A. D. Christensen, vice president; and M. H. Bushby, superintendent. The Southern Coal Co., Inc., and the Sinclair Coal Co. are sales agents for the property.

**Black Diamond Coal Mining Co.,** Birmingham, Ala., recently opened its Ramsay slope mine in Jefferson County, mining the Blue Creek seam. Coal will be shipped via the L. & N., after shipment to and washing at the Black Diamond plant. Capacity is 200 tpd. J. M. Cardwell is superintendent and J. A. Dickinson is foreman.

**A fire March 1** that swept the central cleaning plant of the DeBardeleben Coal Corp., at Empire, near Sumiton, Ala., reportedly destroyed the building housing the washer and screening plant. Cause of the fire was not immediately determined. The

# The *Safe* Choice for Hazardous Locations
# . . . RELIANCE EXPLOSION-PROOF MOTORS
## with Corrosion-Resisting Features



CLASS I, GROUP D DESIGN

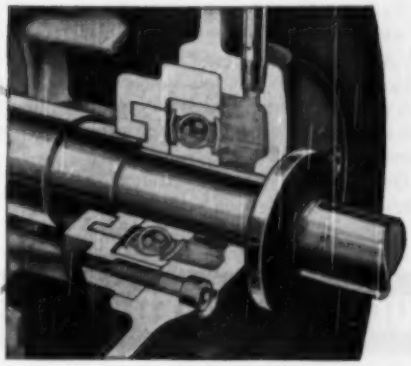
These special application motors are PRECISION-BUILT for safe operation in hazardous locations and manufactured to the standards of the Underwriters' Laboratories for Class I, Group D or Class II, Group F and G. With the addition of cable outlet, they will also meet the standards of the U. S. Bureau of Mines for use on permissible equipment.

An "extra" of vital importance in many locations is the high degree of corrosion-resistance provided by such features as monel name plates, grease pipes and shaft "slingers" and heavy, non-sparking bronze fans. In addition, all joints are sealed, all fits precision-finished, all cap screws made of heat-treated steel and immersed in asphaltum before assembly. Write today for Bulletin C-130 which gives further information you will want to have on Reliance Explosion-Proof Motors, or phone your nearest Reliance representative.

RELIANCE *Precision-Built* MOTORS

**. . . an explosion-proof design for the RELIANCE PRECISION BEARING MOUNTING!**

The Reliance Precision Bearing Mounting which has proved so successful in providing longer bearing life is made explosion-proof through a lengthened path from the bearing to the inside of the motor. Illustrated at right: Cross-sectional view of front end bearing, frame 204.



*Sales Representatives in Principal Cities*

**RELIANCE ELECTRIC AND ENGINEERING CO.**

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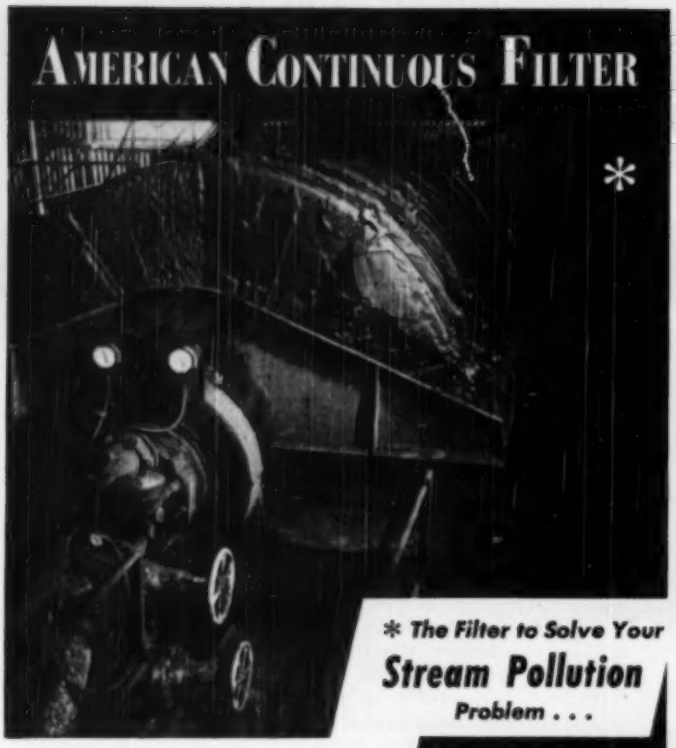
# AMERICAN CONTINUOUS FILTER



*** The Filter to Solve Your Stream Pollution Problem . . .**

**Let this filter "funnel" all wash water from your washery and you will have a filtrate suitable for stream discharge . . . a filtrate practically free of fine coal and silt. And it's quite flexible in that it can handle surges from settling basins or other facilities for settling out solids.**

**Write us about your stream pollution or land pollution problem. If waters carrying solids is the problem, it's entirely probable that the American Continuous Filter will provide the best means for trapping the solids. Numerous washeries are now using Americans for this purpose. Other types of Oliver United filters in other industries are also solving stream pollution problems by means of continuous vacuum filtration.**

**Our engineers have the filtration "know how" and the variety of filters helpful in solving pollution problems.**

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plant had a capacity of 3,000 tpd.

**Philippi Coal Corp.**, Buckhanon, W. Va., recently opened its Redrock drift mine in Upshur County. The Redstone seam is being mined and shipments are to be made via the B. & O. Preparation equipment includes crusher, picking table and vibrating screens. Capacity of 200 tpd is planned.

**Plans for a $700,000 preparation plant** to wash 6,000 tpd of coal produced by a number of companies near Marion, Ill., were announced late in February. The plant is to be built by the newly formed Community Coal Preparation Co., headed by William S. Harrison, former industrial and public relations officer of the Bank of Marion. Construction is to be financed by the sale of stock and a loan from the RFC.

**The Phelps Dodge Corp.** reportedly is planning to close its coal mine at Dawson, N. M., April 30. While reasons for the action were not officially announced, it was reported that the company had been affected by the frequent work stoppages and anticipated a reduced demand from the Southern Pacific R.R., which is converting its Tucumcari-Dawson line to oil.

**The Manor No. 3 mine**, Johnstown Coal & Coke Co., Vindex, Md., and its companion strip operation, were scheduled to be closed March 31, according to an announcement by Andrew B. Crichton, president, reported last month. Market conditions were understood to be responsible for the closing of the operations, which mine the Upper and Lower Kittanning seams.

**Some 700 miners** were to be affected by plans of the Dominion Steel & Coal Corp., Ltd., to close one mine permanently, and two others temporarily, in Nova Scotia. Market losses in the sterling area, as a result of the devaluation of the pound, were reported to make the reduced operations necessary.

## Tell Coal Age, Too!

**MANY COAL-MINING COMPANIES make it a point to write us of personal changes on their staff for inclusion in COAL AGE'S "Personal Notes" section, as well as other news of their company, such as new mine developments, safety and production achievements, annual staff functions, etc., accompanied by pictures where suitable and available. They know that friends, business acquaintances and employees all enjoy reading such news in COAL AGE. You, too, are invited to write us whenever the occasion arises—it takes only a minute. Job changes from the individuals concerned also are welcome. Address: News Editor, COAL AGE, 330 West 42nd St., New York 18, N. Y.**

# The Proof of Quality Is in PERFORMANCE

For over half a century, "HERCULES" (Red-Strand) Wire Rope has been proving its outstanding quality by the accurate yardstick of performance—on all sorts of jobs, and in one industry after another. Such *consistent* performance is not a matter of chance. Design . . . rigid tests and inspections . . . equipment . . . firm standards — are essential factors.

As "HERCULES" is made in a wide range of sizes, types and constructions—Preformed or Non-Preformed—there is in this one grade, a "right rope" for *any* heavy duty purpose.

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## it's "KNOW HOW" that counts

Yes, it takes "know-how" to help save lives, and reduce the frequency and severity of mining accidents. Bituminous Safety Engineers have that "know-how" . . . they are trained, skilled men who combine laboratory and field work to provide complete mine safety for Bituminous Workmen's Compensation policyholders. Their Safety Engineering Program consists of regular mine inspections . . . analysis of mine hazards . . . survey recommendations . . . accident prevention activities . . . reduction of operating expenses resulting from accidents . . . and establishment of production efficiency.

Bituminous Safety Engineers serve mine owners, operators and workers alike with their Safety Engineering Program.

*"Security with Service"*

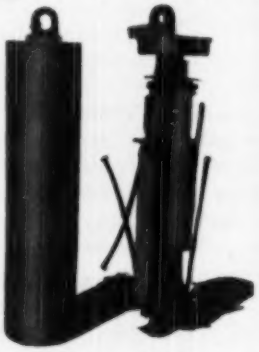
**BITUMINOUS CASUALTY CORPORATION**
ROCK ISLAND ILLINOIS

*Over 30 Years of Service to the Industry*

### Penowa Coal Co. Moves General Offices

JOHN E. ANDERSON (left), vice president and general manager, Penowa Coal Co., welcomes Burgess W. J. Whalen Jr., of Burgettstown, Pa., to a recent open-house marking the company's opening of new general and sales offices in Burgettstown. More than 600 local residents and business men gathered to inspect the new quarters, which consist of 3,200 sq ft of modern facilities specially built in the Mary Ann Bldg. from company-designed plans. The move from Pittsburgh will permit officials to keep in touch with the company's mining operations and 600 employees in the surrounding area and was made to improve efficiency of operations, reported Leonard P. Sasso, president, who will continue to maintain executive offices in Pittsburgh, 28 mi away.


## SHUTTLE CAR RESISTORS



Illustrated, GUYAN replacement elements for permissible shuttle-car traction motors . . . fits in original case and mountings. Resistor available for all type shuttle car traction and reel motors.

**GUYAN MACHINERY COMPANY**
LOGAN, WEST VIRGINIA

Try us for long-lived, trouble-free resistors.


## Tierney Named to Head Coal Advisory Council

Laurence E. Tierney Jr., president, Eastern Coal Corp., Bluefield, was elected chairman of the Bituminous Coal Advisory Council to the Secretary of the Interior, at its regular meeting held in Washington, March 8. Re-elected vice chairman of the group was Ezra Van Horn, executive vice president, Ohio Coal Association.

Committee chairmen announced at that time were: Agenda committee, I. N. Bayless, president, Union Pacific Coal Co.; appointment committee, J. R. Chandler, partner, Pickands, Mather & Co.; and finance committee, H. G. Schmidt, president, North American Coal Corp.

Other members of the Council for 1950-51 are: H. B. Baird, vice president, Coal Div., Eastern Gas & Fuel Associates; Andrew B. Crichton, president, Johnstown Coal & Coke Co.; Irvin Davis, president, Hatfield-Campbell Creek Coal Co.; E. H. Davis, president, New York Coal Co.; R. M. Davis, president, Davis-Wilson Coal Co.; Milton H. Fies, manager, coal operations, Alabama Power Co.; L. Ebersole Gaines, president, The New River Co.; B. R. Gebhart, vice president, Chicago, Wilmington & Franklin Coal Co.; Claude P. Heiner, president, Utah Fuel Co.; R. H. Knode, president, General Coal Co.; Robert P. Koenig, president, Ayrshire Collieries Corp.; George H. Love,

# *a Profit "Break" for You with this "Break-out" Action!*

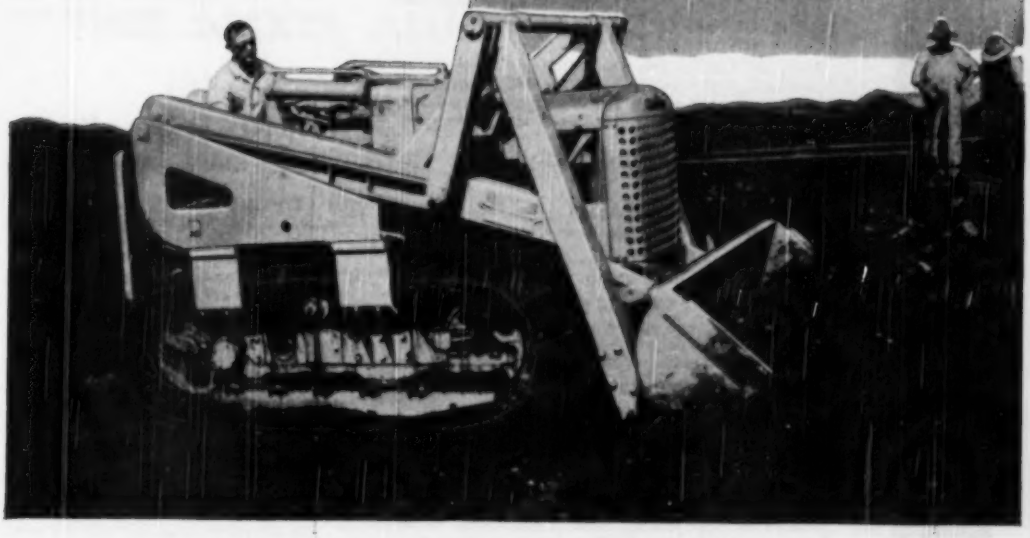
If you're stripping for action in the battle against high stripping costs, here's a good bet for you to check . . . an Oliver Crawler Tractor and Drott Hi-Lift Shovel.

The hydraulically controlled bucket of this efficient unit gives you a break-out action that breaks coal from the vein. The bucket pivots on two rugged shoes, raising the cutting edges a full 16 inches. The bucket then tilts upward like a shovel, assuring a full bucket every time. You get a high percentage of large lumps and that means more money per ton . . . no spillage in loading. 50% less sinking . . . less manual breaking of the vein is required. The sharp break-out action also assures a cleaner pit floor.

With this profit-making team, you also get an added advantage . . . a full 10½-foot lift that makes loading into trucks up to 8½ feet high an easy, fast operation. Operator always has full visibility for fast operation.

And another important point: the Oliver design eliminates excess strains on tractor frames or steering mechanisms, even with a full loaded bucket, so you cut operating and maintenance costs.

For all facts, see your local Oliver Industrial Distributor.



**THE OLIVER CORPORATION**

**Industrial Division: 19300 Euclid Avenue, Cleveland 17, Ohio**

*A complete line of crawler and industrial wheel tractors*

THE OLIVER CORPORATION

*"THE SIGN OF EXTRA SERVICE"*

Here's the kind of job that calls for Collyer *Twin Parallel Type G Mining Cable*—specially constructed to take the punishment of trailing cable service. Look at the power-protecting features of this heavy duty cable:

**FLAT CONSTRUCTION** for wear-free flexing and easy reeling

**PROTECTED GROUND WIRE** for positive grounding of off-track equipment

**NEOPRENE JACKET** — proof against flame, abrasion, chemical action, and oils

**RUBBER INSULATION** of high dielectric strength for greater corona resistance and full moisture protection . . . highly resilient to cushion against sharp or crushing blows

**MEETS REQUIREMENTS** of Penn. Dep't of Mines and U. S. Bureau of Mines for flame resistance — carries approval number P107 embossed on cable sheath, assuring safe performance on every installation.

No wonder Collyer Type G is so widely used for trailing cable service in mines. It will pay you to consult with us on your mining cable requirements. Write for recommendations. Collyer Insulated Wire Co., 245 Roosevelt Ave., Pawtucket, R. I.

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CHOOSE Collyer MINING CABLES

president, Pittsburgh Consolidation Coal Co.; Hooper Love, president, West Kentucky Coal Co.; Harry M. Moses, president, H. C. Frick Coke Co.; M. L. Patton, president, Truax-Traer Coal Co.; C. J. Potter, president, Rochester & Pittsburgh Coal Co.; R. E. Snoberger, president, Binkley Coal Co.; Kenneth A. Spencer, president, Pittsburg & Midway Coal Mining Co.; and R. D. Stockdale, president, Red Jacket Coal Sales Co.

The effects of fuel imports on the coal industry and on the entire fuel structure of the nation were discussed by council members at a press conference held during the day. The council had reached the conclusion, members stated, that present and future anticipated imports of oil will have a very serious effect on the coal, oil and transportation industries and threaten the security of the nation since they are displacing the American facilities for producing fuels of all types. As a result, should foreign oil be limited, there would not be sufficient domestic capacity to take care of the country's fuel requirements, it was maintained.

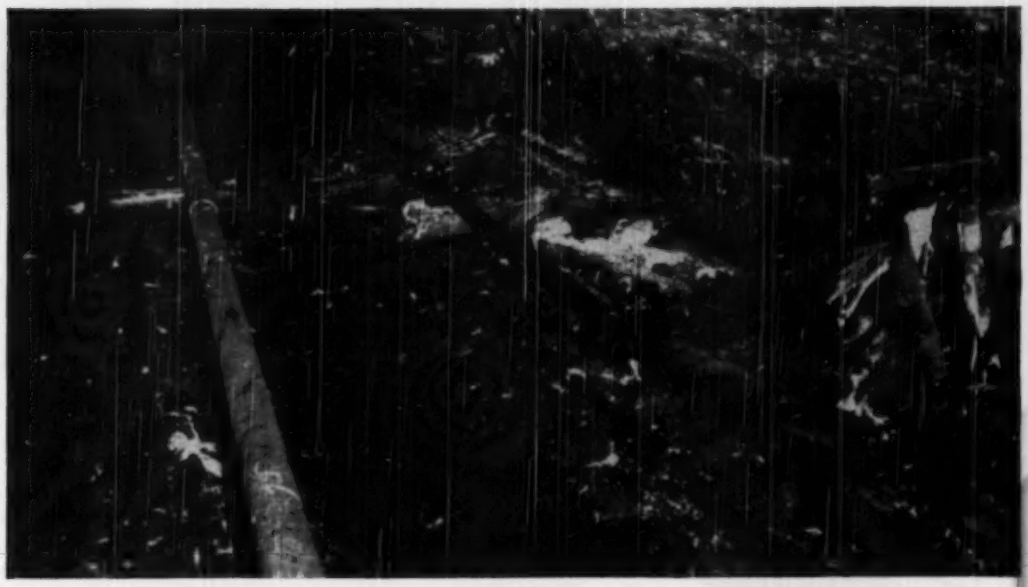
Fuel oil and other oils converted into fuel oil are now being imported into the country at a rate of 460,000 bbl a day, equivalent to 115,000 tons of coal daily, the National Coal Association recently reported.

## 108 New Cleaning Plants Begun During 1948-49

The coal industry began construction of 52 new cleaning plants in 1949, as compared with the total of 56 started in 1948, *Keystone Coal Buyers' Manual*, a *Coal Age* affiliate, reports, in releasing the results of its annual study of preparation plants.

The industry's investment in new preparation facilities during this 2-yr period is a self-evident rebuttal to the recent charges that coal is "a sick industry," J. R. Forysthe, *Keystone* manager, points out. The 108 plants begun in 1948-49 will have a total yearly capacity in excess of 70,000,000 tons of clean coal, it is estimated. This expansion of the industry's service to customers is particularly significant when compared with the total of 461 plants in operation during 1947, Mr. Forsythe said. The 1950 edition of *Keystone*, scheduled for publication in June, will provide detailed operating data on all cleaning plants in the United States.

A study of capacities as reported to *Keystone* by operators of existing plants, together with analysis of new contracts regularly reported to *Coal Age* by manufacturers, indicates that the industry now has the capacity to produce over 350,000,000 tons of clean coal a year, based on two-shift operation 220 days a year, the publication reports.



# THIS ALCOA ALUMINUM PIPE HAS BEEN IN SERVICE FOR NINE MONTHS

## lasts up to 10 times as long as ordinary pipe

Carrying highly corrosive acid mine waters that bite through other metals, Alcoa Aluminum Pipe lasts from two to ten times as long as ordinary pipe. And based on pipe cost alone, you make money every time Alcoa Pipe doubles pipe life. Alcoa Pipe is easy to join, using familiar standard fittings. Never gets brittle at low temperatures.

*SAVE* not only on lower-cost-per-month but on installation as well. Alcoa Pipe weighs one-third as much as ordinary pipe—goes in faster. Operators have found that for low seams, aluminum pipe costs less *in place!*

*SAVE* when you specify Alcoa Aluminum Pipe for other jobs—dust spray pipe and compressed air lines, for example. Call your local Alcoa sales office to get full story from your Alcoa representative. Or send coupon at right to ALUMINUM COMPANY OF AMERICA, 1979D Gulf Bldg., Pittsburgh 19, Pa.

ALUMINUM COMPANY OF AMERICA
1979D Gulf Building
Pittsburgh 19, Pa.

Gentlemen: Please send copy of your booklet, "Alcoa Aluminum Pipe" to

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Company .....
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Company Address .....
City ..... State .....

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INGOT • SHEET & PLATE • SHAPES, ROLLED & EXTRUDED • WIRE • ROD • BAR • TUBING • PIPE • SAND, DIE & PERMANENT MOLD CASTINGS • FORGINGS • IMPACT EXTRUSIONS
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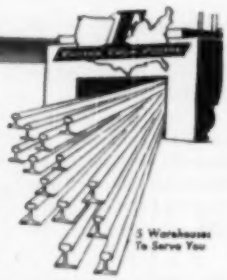

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**FREE RAIL RULER**
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**STEEL SHEET PILING • PIPE & PIPE FABRICATION • RAILS • TRACK ACCESSORIES • WIRE ROPE**

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## State Inspectors Against Roof Bolts in Anthracite

Roof-bolting "should never be used in the anthracite region where human life is at stake, except in conjunction with sufficient props or timbers," six state mine inspectors who recently concluded experiments in several mines have reported to the Pennsylvania Department of Mines. "We are amazed that anyone enjoying security from this dreadful roof fall evil would so completely disregard the security of the miner by advocating the general use of roof bolts instead of props, timber, logging and forepoling," the report stated.

Pointing to the fact that mining in one seam over another subjects the area to "a slow constant crush," the report continued: "The pressure of the great mass from the surface to the lowest coal seam, honeycombed as these are by mining, caused innumerable fractures in the rock strata overlying the coal seams, thus rendering the roof strata of little value for anchoring purposes."

Roof bolting, it was said, is "rigid and does not lend itself to the cushioned warnings given by props and timber—warnings that the practical miner has relied on since the beginning of mining. Investigation of innumerable fatalities resulting from roof falls reveals, not the need for a new system of roof support, but rather the prompt application of our present system of timbering," the report maintained.

Although federal inspectors have advocated use of roof bolting, state mine inspectors have been instructed by Richard Maize, Pennsylvania Secretary of Mines, not to permit it unless props and timbers also are installed as required by law.

## Oil Groups to Fight Gas Competition

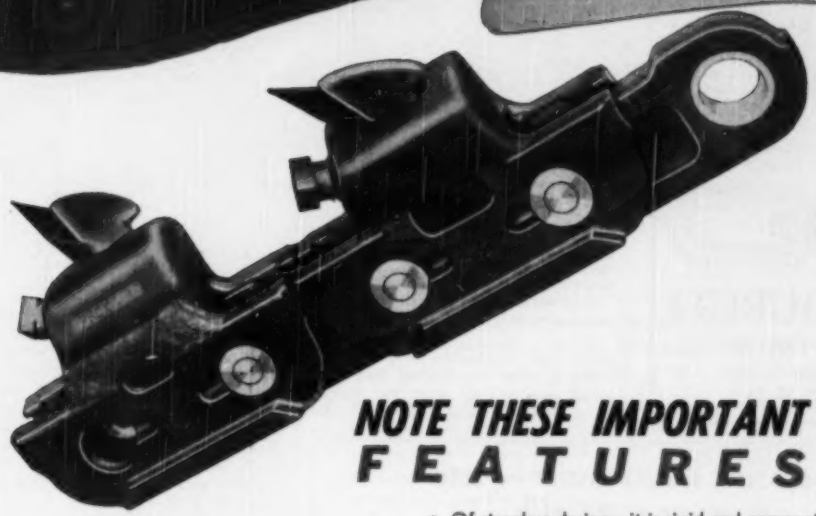
The Atlantic Coast Oil Conference plans to invite oil-heating groups along the Eastern Seaboard to a meeting to formulate plans to combat forthcoming competition from natural gas, Harry B. Hilts, secretary of the conference, recently announced. The conference has completed an extensive study of natural-gas competition and has made on-the-spot surveys of actual developments in Rochester and Detroit, where natural gas has been introduced.

"We now have enough information," Mr. Hilts said, "to formulate a program in cooperation with other oil groups." A four-prong campaign for oil heating was outlined by Mr. Hilts, stressing: (1) merchandising at the distribution level, (2) promotion on a broad scale, (3) installation inspection services in large metropolitan areas and (4) an educational drive to develop "higher-type burner service men."

"Before natural gas from Texas

# 6 PROX CHAIN FEATURES

DEPENDABILITY
EXTRA LONG SERVICE
ADDED SAFETY
. . . QUICK AND EASY MAINTENANCE



## NOTE THESE IMPORTANT FEATURES

- Of strapless design—it is rigid and compact.
- No bulky heads that must be pulled through the cutting operation.
- Interlocks are machined—pins and bushings are hardened for longer cutting life.
- No chain whippage as it comes off the drive sprocket.
- Sumps easier—cuts easier thereby eliminating the cloud of dust normally created in the cutting operation.
- Parts may be easily replaced in a few minutes on the job.

**PROX DUO BIT**

The Prox Duo Bit is designed to give coarse cuttings—yet it is rugged enough to withstand the hardest of cuttings.

The Prox Duo Bit is held by only one moving part—no other parts for you to keep in your stock bins.

*Send for Circular*

PROX
ON THE BANKS OF THE WABASH — SINCE 1875

FRANK PROX COMPANY
TERRE HAUTE, INDIANA

FOR SAFETY'S SAKE, SUPERIOR COUPLINGS

Drop Forged Links

Drop forged for strength, Superior Swivel and Single Link Couplings are built to stand the gaff. No welds to let go with resulting wrecks. Superior Couplings on your mine cars will prevent accidents and reduce haulage costs. Order Superior Couplings for your replacements and specify them on new equipment.

DROP FORGED SWIVEL COUPLINGS

PITTSBURGH
KNIFE & FORGE CO.
1421 Reedsdale St., N.S.
Pittsburgh 12, Pa.

## Coal and Business Activity

| | | 1950 to This Date | 1950 Over 1949, to Date |
|---|---|---|---|
| Est. anthracite prod., week ending March 11 | 1,202,000 | 7,023,000 | —11.5% |
| Est. bituminous prod., week ending March 11 | 13,200,000 | 58,282,000 | —49.2% |

Source: U. S. Bureau of Mines.

| | Bituminous Coal Stocks (Thousands, net tons) | | | | Consumption (Thousands, net tons) | | |
|---|---|---|---|---|---|---|---|
| | Feb. 1, 1950 | Days' Supply | Jan. 1, 1950 | Feb. 1, 1949 | Jan., 1950 | Dec., 1949 | Jan., 1949 |
| Electric power utilities | 15 006 | 64 | 17,794 | 24,150 | 7,306 | 7,296 | 8,251 |
| By-product coke ovens | 7,003 | 28 | 9,893 | 12,481 | 7,830 | 7,950 | 8,654 |
| Beehive coke ovens | † | † | † | † | 152 | 112 | 973 |
| Steel and rolling mills | 008 | 31 | 912 | 1,827 | 704 | 722 | 678 |
| Cement mills | 884 | 42 | 1,063 | 1,184 | 651 | 725 | 733 |
| Other industrials | 9,250 | 32 | 10,210 | 17,169 | 8,874 | 9,046 | 10,401 |
| Railroads (Class I) | 3,010 | 18 | 3,849 | 9,551 | 5 320 | 5,663 | 7,498 |
| Retail dealers | 1,081 | 3 | 1,390 | 2,243 | 11,136‡ | 11,800‡ | 9,477‡ |
| Total | 36,992 | 27 | 45 111 | 67,805 | 41,982 | 43,036 | 46 005 |

Source: U. S. Bureau of Mines. †Not available. ‡Retail dealer deliveries.

| | Latest Week* | Month Ago | Year Ago |
|---|---|---|---|
| *Business Week* Index of Business Activity, wk. ending Mar. 11 | 188.3 | 191.4 | 195.0 |
| Steel ingot operations (% of capacity) | 89.8 | 90.7 | 102.0 |
| Electric power output (million kw-hr) | 5,937 | 5,971 | 5,531 |
| Crude oil and cond. production (daily avg., 1,000 bbl) | 4,827 | 4,951 | 5,181 |
| Misc. & L.C.L. carloadings (daily avg., 1,000 cars) | 68 | 67 | 74 |
| All other carloadings (daily avg., 1,000 cars) | 27 | 35 | 43 |
| Prices, spot commodity index (Moody's, Dec. 31, 1931 = 100) | 358.1 | 357.6 | 371.8 |
| Prices, industrial raw materials (B.L.S., Aug., 1939 = 100) | 219.1 | 220.4 | 262.6 |
| Prices, domestic farm products (B.L.S., Aug., 1939 = 100) | 303.1 | 303.2 | 296.0 |
| Prices, finished steel composite (*Iron Age*, lb) | 3.837c | 3.837c | 3.714c |
| 90 stocks, price index (Standard & Poor's Corp.) | 136.5 | 136.3 | 119.0 |

*Date of latest week for each series on request.

went into Rochester last year, oil burners were out-selling gas units about two to one. Now gas burners have overtaken and passed oil units —in a matter of seven months," the surveys reported. When Detroit received increased supplies of natural gas last fall, the studies pointed out, the local utility received 90,000 applications in 30 days, 50,000 of which have resulted in installations. Some 100,000 gas units are expected to be installed this year.

*You can sink shafts easier—faster—at lower costs with*

COMMERCIAL STEEL LINER PLATES

• Commercial liner plate flanges are turned in on all four sides thus bolting is simple—bolt holes are more accessible—matching is easier and quicker. With bolts inside the plates, nuts do not become clogged with muck and sand. These are but a few of the many advantages of using COMMERCIAL liner plates for your shaft and tunneling operations. They are adaptable to all sizes of tunnels and shaft. Consult a Commercial Engineer on your next shaft or tunnel job.

THE COMMERCIAL
SHEARING & STAMPING CO.
YOUNGSTOWN, OHIO

## McGraw-Hill Announces Executive Changes

Curtis W. McGraw, formerly vice president, treasurer and vice chairman of the board, McGraw-Hill Publishing Co., Inc., Feb. 24 was elected president and chairman of the board, succeeding his brother, James H. McGraw Jr., retiring to be relieved of the burden of executive management. Associated with the company for 35 yr, James H. McGraw Jr. had headed the organization since the retirement 20 yr ago of his father, founder of the company. Curtis W. McGraw joined the McGraw-Hill Book Co. in 1920 and had been vice president and treasurer of the publishing company since 1944.

At the same time, Col. Willard Chevalier, associated with the company since 1922 in various editorial and publishing capacities, was appointed to the newly created post of executive vice president. Col. Chevalier had served as executive assistant to James H. McGraw Jr. for the past 5 yr.

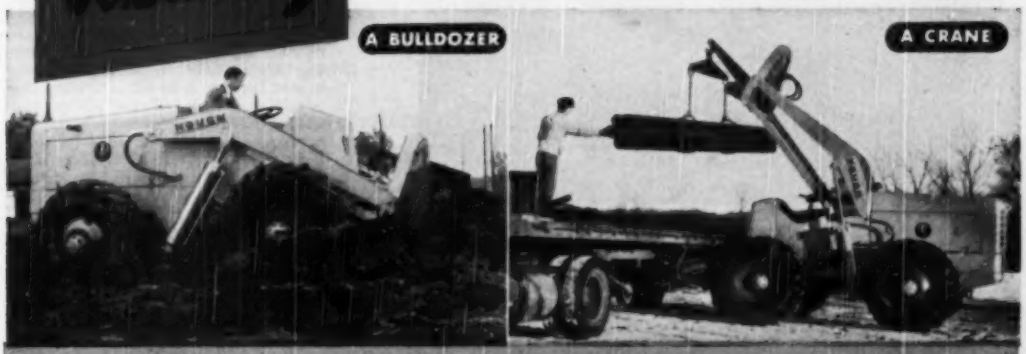
Joseph A. Gerardi, formerly vice president and secretary, was elected treasurer, to succeed Curtis W. McGraw.

Model HM
4-WHEEL DRIVE
PAYLOADER
SPEED—
POWER—
TRACTION—
*Versatility*

The Model HM Payloader is a versatile profit-maker for both strip pit and underground coal mines. Its 4-wheel drive on large earthmover tires gives hard-hitting digging power and positive traction to travel and work on all kinds of ground . . . to dig, load, grade, lift, move tools, carry and spot equipment. Not a fair weather worker — but a year 'round tool.

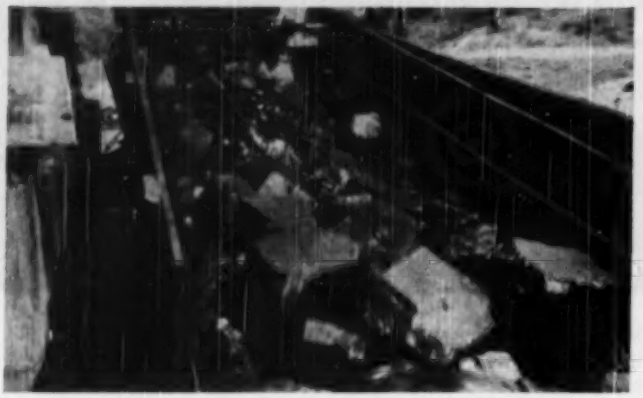
This completely Hough-built 1½ yard tractor shovel has many other outstanding mechanical and operating advantages . . . power-booster steering, 76 h.p. gasoline or diesel engine, double-acting hydraulic boom and bucket control, unequalled ease of operation, operator comfort and visibility. Get complete HM Payloader facts from your Hough Distributor today or write The Frank G. Hough Co., 735 Sunnyside Avenue, Libertyville, Illinois.

SEND for HM catalog, or literature on other Payloaders — the 1¼ yd. Model HL, the ¾ yd. HF, the ½ yd. HE, the 12 cu. ft. HA.




HOUGH
PAYLOADER
Manufactured by THE FRANK G. HOUGH CO.

# Get in the Seco Circle for Clean, Uniform Coal



## 1. SECO'S TRUE CIRCULAR ACTION

For accurate sizing of coal at maximum capacities. Seco engineering produces smooth performance. No bobbing, no weaving . . . The load moves over and through the screen surface rapidly. Tonnages keep up . . . while maintenance is kept down.

## 2. COAL SCREENING PROFIT CIRCLE

Coal operators using Seco vibrating screens report greater profits on their coal. That's because they are able to meet the market's demands for coal that is clean . . . and accurately sized.

Let Seco screening experts help you get clean, properly-sized coal—at low cost. Write CA-4 for Coal Bulletin No. 11.

SECO VIBRATING EQUIPMENT

**SCREEN EQUIPMENT CO., INC.**

1752 WALDEN AVE. BUFFALO 21, NEW YORK

In Canada, United Steel Corp. Ltd., Toronto, Ont.


## Pittsburgh Consol Seeks To Broaden Charter

Amendment of the articles of incorporation of the Pittsburgh Consolidation Coal Co. to permit the company to engage in the mining of ores, stones and other minerals, as well as timber, gas and oil operations, will be requested of stockholders at a meeting to be held April 19.

The company has no present plans for enlarging the scope of its activities, George H. Love, president, wrote stockholders last month. However, he wrote, the directors deemed it wise that the corporate functions be enlarged to permit more general activities if they should become necessary or desirable.

Stoppages last year cost Pittsburgh Consol almost $8,000,000 in profits, the company's annual report revealed March 17. Its 1949 net income totaled $13,680,587, or $6.32 a share, as compared with the 1948 net of $21,316,340, or $9.85 a share. The drop reflects "the extensive work stoppages in coal production during the year," the report stated.

In his statement to stockholders, Mr. Love said: "The problems of labor relations in coal are complex and difficult, but there must be an approach to finding a common goal for labor and management." In estimating the 1950 demand for bituminous at 450,000,000 tons, Mr. Love said: "An annual tonnage of 450,000,000 should permit an aggressive coal industry to carry on with continued improvement in efficiency and productivity."

## Kentucky Assembly Kills Safety and Strip Bills

The Kentucky House March 13 turned down by a vote of 49 to 39 a bill that would have incorporated the Federal Safety Code into the state's mining laws. In addition to the many changes in safety regulations called for, the measure also provided for 25 district mine inspectors, raised their pay from $4,200 to $5,000 and permitted them to hold office "during the period of capable, efficient service and good behavior." Present laws call for an adequate number of inspectors, appointed for 4-yr terms. Opponents of the bill maintained that its primary purpose was to give the union more power in Kentucky.

In the closing hours of the 1950 session of the Assembly, the state Senate March 20 voted 20 to 18 to kill a bill to regulate strip mining throughout the state. The bill had followed a survey of stripping and a published report of the findings made by a commission authorized by a previous session of the legislature. The measure first was amended to eliminate the enforcement regulations and then further amended to return a portion of them. The original bill also had been considerably changed by previous action of the House.

# Ashland

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## ALL THE WAY!

FROM THE MINE

IN TRANSIT

IN THE HOME

**Right down the line, Ashland Permatreat Coal Spray saves and satisfies by permanently protecting against dust, freezing, windage loss.**

**Operators, dealers, industrial and domestic consumers all profit with coal treated with Ashland Permatreat Coal Spray. We'll gladly tell you how.**

Check √ THESE ADVANTAGES . . .

- DUSTPROOFS
- PERMANENT EFFECT
- ODORLESS TREATMENT
- EASILY ACCESSIBLE SUPPLY
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Shown at the left are the owner and a portion of the employees of the No. 4 mine, Flick Coal Co., Kimmelton, Pa., who were among the first in Central Pennsylvania to complete 100% training in the accident-prevention course for safety committeemen and miners offered by the U. S. Bureau of Mines, Johnstown.

Kneeling are: D. Yoder (left); Ishmael J. Ratliff, federal mine inspector and instructor; J. A. Flick, owner and superintendent; C. Williamson; F. Meyers; H. Zarefoss; F. Nicholson, with Duke, the watchdog; E. Flick Sr.; G. Mort; J. Logue; and Henry E. Basinger, federal mine inspector and instructor. Standing: R. Flick (left), E. Feathers, M. Flick, H. Flick, D. Rosbaugh, R. D. Flick, H. Shroyer, G. Carlson and D. Korns.

## W. Va. Fireboss Issue To Be Decided in Fall

A decision on the legality of section foremen making fireboss inspections in West Virginia is not to be expected until next fall, as a result of the state supreme court's rejection late in February of the attorney general's re-


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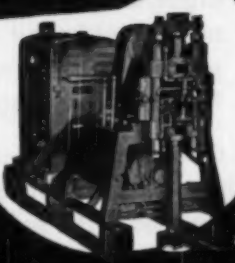

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quest that hearings on the question be moved up to April instead of next September. The court had agreed earlier in the month to consider an appeal from the Kanawha County court ruling that permitted a foreman to perform both duties *(Coal Age*, March, p 154). Separation of the duties had been ordered by Arch J. Alexander, chief, W. Va. Department of Mines, on the basis of an interpretation issued by the attorney general's office.

## FBI to Check Lewis Use Of "Secret Signals"

A thorough investigation by the FBI of the charges that John L. Lewis used "secret signals" to keep the mine stoppage going while publicly instructing miners to return to work was ordered March 20 by U. S. Attorney General J. Howard McGrath.

The announcement was made by Assistant Attorney General H. Graham Morison, who prosecuted the contempt of court case against the UMWA. He said that he had advised all district offices to run to earth every source of information available, following the charges made March 17 by Lloyd H. Sidener, who was ousted as president of the UMWA local at Canton, Ill., for his attempt to lead miners back to work in accordance with the court's injunction.

In his statement, Mr. Sidener charged that although Mr. Lewis Feb. 11 sent telegrams "ordering" the miners back to work, he also sent a secret signal orally down through his "chain of command." As president of Local 7455, Mr. Sidener said, he received the signal, "The whistle blew one," in a telephone call from Bernard Beasley of Canton, chairman of Sub-division 2 of the union's Illinois District 12, and accordingly passed the word along to members of the local to continue the stoppage. The signal, "The whistle blew three," would have meant that the miners should return to work, he said.

Mr. Sidener filed unfair labor charges against the UMWA with the NLRB in Chicago March 15, maintaining that the union had fined him $50,000 for trying to return to work Feb. 25 and had levied a fine of $25 a day for each day he might try to work in the future. He also filed unfair labor charges against the United Electric Coal Cos., for discharging him from his job as a shovel operator at the Buckheart mine, contending that he was dismissed because other workers threatened to strike if he were not discharged.

Earlier, the Circuit Court of Appeals set a schedule for the government's appeal from Judge Keech's decision of not guilty in the contempt of court case against the UMWA, The government's brief was to be filed by March 20, the union's brief by April 14 and the government's return

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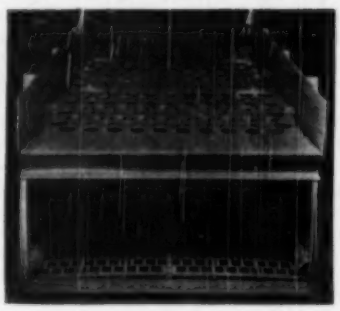

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brief by April 21, with oral argument set for April 26.

In the initial brief, the Department of Justice contended that the decision and the union argument completely reversed progress toward legal recognition of union responsibility in recent years. The brief charged that Judge Keech came to the "startling conclusion" that a union could act only and exclusively through its officers. Judge Keech reached an "absurd result," the government said, in holding that the union could disclaim responsibility for the concerted action of its members on the ground that its officers (agents of the miners) had directed the miners to return to work.

Other courts had ruled that no matter what union officials might do, the ultimate responsibility rested with the collective membership, the government said, and this decision meant that the actions of the principals could be shielded behind the declaration of the agent. The federal courts would be "impotent" to deal with strikes in critical emergencies if the Keech decision is allowed to stand, it said. In discussing Mr. Lewis' order of Feb. 11 that the miners return, the brief said "a plainer case of sham and pretense could hardly be presented."

## EG&FA Official Urges Blood-Typing of Miners

Blood-typing of all mine employees of Eastern Gas & Fuel Associates to permit speedy determination of local sources for the proper blood when needed for transfusions is being advocated by C. R. Stahl, head of the company's accident-prevention department, Mt. Hope, W. Va. Establishment of blood-type records have been suggested to all the company's mining operations, following a successful test of the plan at its Carswell mine, in McDowell County, West Virginia.

Results of the Carswell test were covered in a report to Mr. Stahl by R. J. Marrs, general inspector, who stated that the system had been the means of saving lives that otherwise might have been lost.

While hospitals maintain blood banks, the Carswell plan saves considerable time when a delay may be a matter of life or death to a patient, it was pointed out. With the system, blood donors can be readily located in the immediate community, without waiting until the proper blood can be obtained from a distant point.

As a result of organized effort, most of the employees at Carswell were typed in one day, and the others soon afterwards. New employees are typed as soon as they are hired. Three records of each employee's blood type are made. One is kept at the mine, the second is given to the American Red Cross and the third is given to the worker, with the request that he carry the card on his person.

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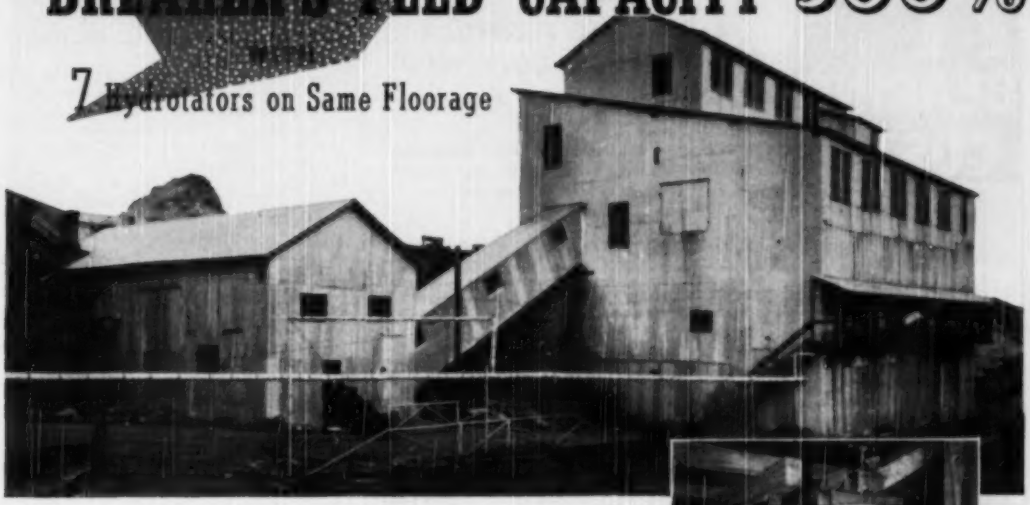
## 7 Hydrotators on Same Floorage



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There is now a Hydrotator unit for preparing any size of coal. Let us show you how the tremendous post-war engineering advancements of the Hydrotator method are increasing the efficiency of both large and small operations.

*Pictured here are 2 of the 7 Wilmot Hydrotators installed in the Capone Coal Co. plant. Above, for preparing Nut; left, for Pea.*

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## Foremen Feted at Annual Big Sandy-Elkhorn Meet

Approximately 300 members, wives and guests attended the annual meeting of the Big Sandy-Elkhorn Coal Mining Institute held in the Wheelwright, Ky., high school auditorium Feb. 25. Dinner served by the home economics department of the Wheelwright high school was followed by a floor show.

A feature of the evening was the presentation of gold lapel "no accident" buttons to foremen who have supervised their sections for 4, 5 or 6 yr without members of their crews suffering a lost-time accident.

Men honored with 6-yr buttons were: N. L. Akers, Consolidation Coal Co. (Ky.); Ersel Ratcliff, H. C. Hatfield and T. R. Simpkins, Republic Steel Corp.

Those receiving 5-yr buttons were: Dewey Looney and Willie Baker, Consolidation Coal Co. (Ky.); and W. A. Pack, Inland Steel Co.

Awards of 4-yr buttons were made to: Oscar Brafford, Inland Steel Co.; and Raymond Ratliff, Republic Steel.

A plaque for the best 1949 safety record among "Class A" mines in the institute was awarded to Mine No. 207, Consolidation Coal Co. (Ky.), Div. of Pittsburgh Consolidation Coal Co. The Kentucky Elkhorn Mining Co. received the plaque for the best 1949 safety record among "Class B" mines.

The Jackhorn mine of The Elk Horn Coal Corp. also was presented with a plaque, for having mined 1,265,870 tons from July 12, 1946, to Nov. 26, 1949, without a fatal accident.

New officers of the institute elected for the coming year were: president, John L. Coyer, Republic Steel Corp.; first vice president, C. L. Sherman, Stephens Elkhorn Fuel Corp.; second vice president, Ballard Plummer, Princess Elkhorn Coal Co.; and third vice president, A. M. Ayers, Russell Fork Coal Co. J. H. Mosgrove was re-elected secretary-treasurer.

Named directors of the institute were: J. T. Parker and Arthur Bradbury, Inland Steel Co.; M. K. Reed, Liberty Elkhorn Mining Co.; J. E. Green, Utilities Elkhorn Coal Co.; V. A. Hensley, Eastern Gas & Fuel Associates; B. F. Gish, South-East Coal Co.; M. E. Prunty, J. C. Dann and S. H. Kegan, Consolidation Coal Co. (Ky.); Harry McCarthy, The Clear Branch Mining Co.; J. O. Watson III, Farwest Coal Co.; George E. Evans, Evans Elkhorn Coal Co.; James Fleming, The Elk Horn Coal Corp.; and Fred Sherman, North-East Coal Co.

## Official Reports Lewis Assists Oil Industry

An upsurge of demand in the last three years has been met by the oil industry "with an industrial expansion of gigantic proportions." Dr.

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This yarn, which puts toughness in heavy-duty truck tires and makes thinner, stronger hoses, can also make more efficient conveyor belts for your mine.

We'll be glad to furnish the names of suppliers of belts made with "Cordura." You can get full information about "Cordura" in the new manual, "Sinews for Industry." It gives physical properties of "Cordura" rayon, describes many successful applications and tells how "Cordura" improves the efficiency of conveyor systems. For your free copy, address Room 4527, Rayon Division, E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware.

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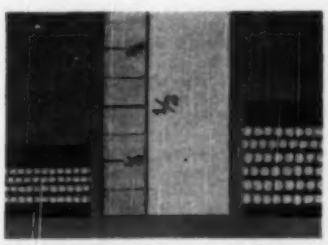
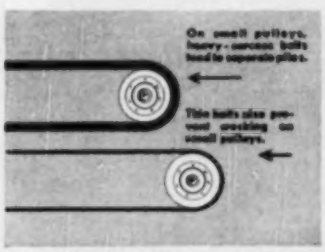
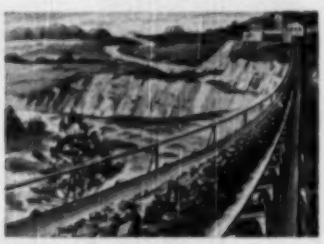
**for RAYON . . . for NYLON . . . for fibers to come look to DU PONT**



**GREATER STRENGTH** of belts built with "Cordura" is illustrated above. At left is cross-section of four-ply belt sinewed with "Cordura." It's stronger than conventional 6-ply belt at right, yet only half as thick. This thin, light belt is particularly desirable where panel equipment is moved frequently.




**MORE FLEXIBLE.** Belts built with "Cordura" have less tendency to crack and separate plies when run over small pulleys required in confined working space. And belts built with "Cordura" have less stretch, so less take-up room is needed. And they trough well under any loading conditions.



**LONGER LIFTS.** The high tensile strength of "Cordura" Rayon eliminates costly transfer points. For example, a belt reinforced with seven plies of "Cordura" can lift 1000 pounds of overburden per hour up a 15° slope over 1000 foot centers. It has design tension of 900 pounds per inch of width.

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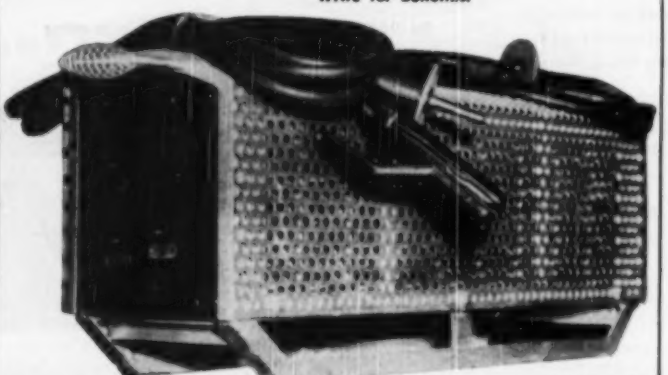

**GUYAN MACHINERY CO.** LOGAN W. VA.


Robert E. Wilson, chairman, Standard Oil Co. (Ind.), said March 20. "The result is that we are again in a buyer's market on gasoline and would be on fuel oil, were it not for a gratuitous assist from John L. Lewis."

## Miners Resume Work

(*Continued from p. 135*)

off, doors were closed in schools and colleges attended by over 250,000 students, and over 200,000 workers in allied industries had been laid off. At least 10 states had invoked emergency statutes to cope with the coal crisis.

### Union Freed of Contempt

Charged by government prosecutors with contempt of court when 370,000 bituminous miners defied a court order to return to their jobs, the UMWA went to trial Feb. 27 in Washington before Federal Judge Richmond B. Keech. UMWA attorneys argued that official union orders to resume work on Feb. 11 and 17 had met the requirements of the court and that the miners' refusal to work was spontaneous and individual. The government contended that the miners' mass idleness was evidence of collusion and that the union should be held responsible for the concerted actions of its members. The trial ended March 1 and the following day Judge Keech, pointing out that the court could not convict "on conjecture," ruled that the government had failed to prove its case.

With a Presidential fact-finding board and federal mediators listening in, wage talks were resumed March 3. Meanwhile, on March 2, President Truman at last admitted that an emergency existed and, after a Cabinet meeting the following day, asked Congress for seizure powers on the following terms: (1) that two boards be established, one to fix wages and the other to determine fair compensation to the mine owners; (2) that the government not be permitted to make a contract on wages and working conditions; (3) that properties be returned to the owners when they and the employees reached agreement; and (4) that a commission be set up to study the coal industry. Nothing in the President's request asked that the government take the profits of mine operations during seizure. In transmitting his message, the President called coal a "sick industry."

Return of the miners to their jobs, following telegraphic orders from UMWA headquarters, removed the need for a seizure law and took some of the punch out of President Truman's request for an investigating commission. However, even after the contract was signed, Mr. Truman wrote Speaker of the House Rayburn and Vice President Barkley that the need for the study was "in no way diminished."

Outlining the scope of the proposed

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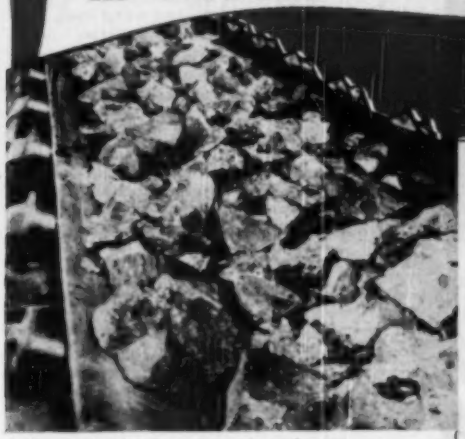
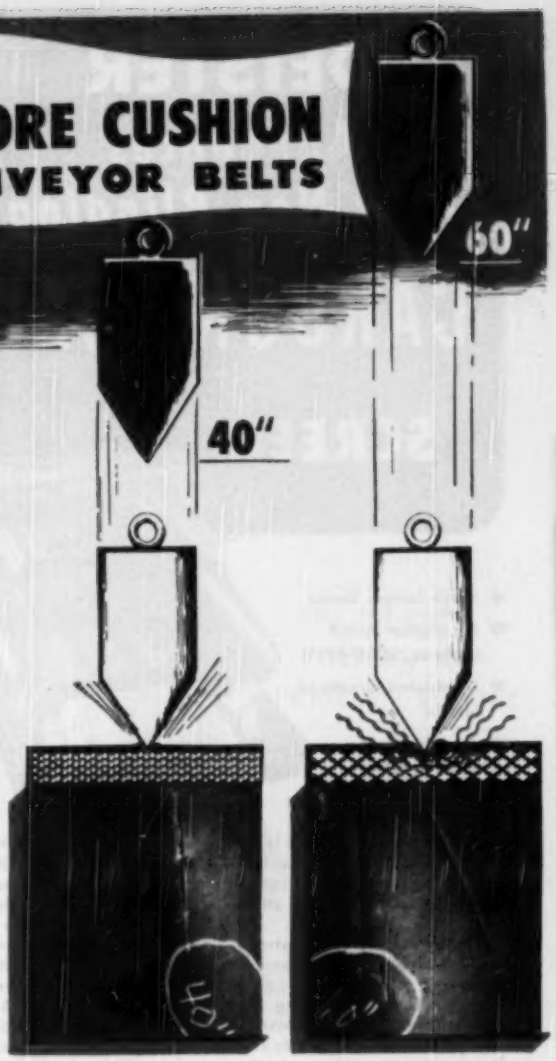
# Proves 50% MORE CUSHION in *Homocord* CONVEYOR BELTS






When rocks like those shown here drop on a conveyor belt, every shock at loading point shortens the life of the belt. To overcome this, extreme cushion and resilience are built into Homocord Conveyor Belts. This "Through-and-Through" Cushion gives Homocord Conveyor Belts longer life than any other belt.

To measure comparative cushion and shock-absorbing qualities, Raybestos-Manhattan engineers devised the "killer" test shown at right. A heavy metal weight, ground to a blunt edge is dropped from various measured heights until it ruptures the cover of the sample under test.

Notice the shock lines indicate how a regular conveyor belt's "boardy" resistance to impact leads to cover gouging and breakdown. The shock lines on the Homocord cross section show how "Through-and Through" cushion and resilience of the Homocords absorb impact without injury.

### *Homocord* CUSHIONED CONSTRUCTION HAS 8 ADVANTAGES

1. Complete bonding of every member into a homogeneous structure.
2. Holds metal fasteners, with no loss of draw-bar strength.
3. Lateral flexibility permits perfect troughing, accurate training, reduces fatigue of flexing at bend in troughing idlers.
4. Resists destructive action of continuous or heavy impact feeding.
5. Cushion Homocord body and low inelastic stretch reduce wear and tear of top cover.
6. Homocord body reduces hazard of punctures.
7. The Homocords are completely encased in Flexlastics; moisture not admitted, mildew cannot start.
8. Longer life, lower cost per ton.

**REGULAR DUCK BELT**

Unretouched photo shows actual rupture results of a 40" Guillotine Drop Test on a conventional 4-ply 32-oz. duck belt with 1/8" top cover, 1/16" bottom cover. With little cushion to absorb impact, the cover ruptures and deterioration sets in.

***Homocord***

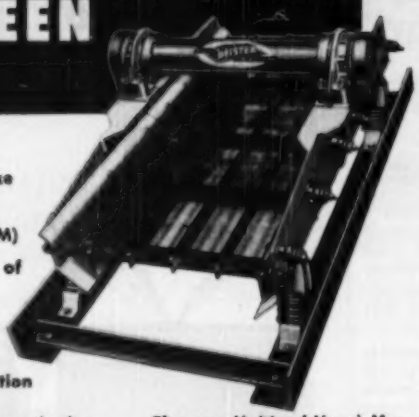
Unretouched photo shows comparable degree of impact effect from a 60" Guillotine Drop Test on a 4-ply AEH Homocord Conveyor Belt with 1/8" top cover and 1/16" bottom cover. Impact of falling weight is dissipated through the Homocords, cushioned in Flexlastics.

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

## RAYBESTOS-MANHATTAN, INC.

*Manufacturers of Mechanical Rubber Products • Rubber Covered Equipment • Radiator Hose • Fan Belts • Brake Linings • Brake Blocks • Clutch Facings • Packings • Asbestos Textiles • Powdered Metal Products • Abrasive & Diamond Wheels • Bowling Balls*

# DEISTER
## Announces New Non-Blinding
# CARBON COAL
## SCREEN



- Much Longer Stroke
- Far Higher Speed (approx. 2000 RPM)
- Graduated Length of Stroke
- Aerodynamic Construction
- Unitized Head-Motion

This new Deister Screen is designed especially for the faster, better handling of carbon coal and other damp, sticky, fines.

An extremely rapid stroke-cycle has been developed by removing unnecessary dead weight. Light but strong materials and aircraft construction principles are used in both head-motion and supporting members.

The new Unitized Head-Motion is precision-built and jig-assembled . . . is demountable as a unit and interchangeable so that there is never any need for downtime when screens are operated in batteries.

You'll want all the facts on this new Deister Screen for faster, more profitable handling of damp, sticky materials. Write for Bulletin No. 52 —today.

This cut-away shows the new Unitized Head-Motion of the Deister Carbon Coal Screen.

DEISTER SCREENS

DEISTER MACHINE COMPANY
FORT WAYNE 4, INDIANA


investigation, the President asked that it look into the following matters:

1. The size and character of the coal industry necessary to the national security, health and welfare.

2. The size, location and character of coal reserves and their relationship to the future of the coal industry.

3. The existing and prospective technological means and costs of mining, distributing and using coal, and their sociological implications.

4. The existing and prospective employment conditions of coal miners, including wages, hours, safety factors, welfare and retirement provisions and opportunities for steady employment.

5. The existing and prospective characteristics of competition among companies in the coal industry.

6. The existing and prospective markets for coal.

### "Co-ordinator" for Coal?

Meanwhile, speculation grew on two questions:

1. Whether northern operators and others would get around to appointing a full-time "co-ordinator" to handle their relations with the union and spur the industry's economic rehabilitation. This move has been urged openly in some operator circles, with Harry M. Moses, president, H. C. Frick Coke Co., most frequently mentioned for the position.

2. Whether the President's investigation of the coal industry actually would get under way. As pointed out, return of the miners to their jobs took some of the steam out of Mr. Truman's proposal.

In the Senate, Senator Robert A. Taft, Ohio, took sharp exception to the administration's handling of the contempt trial against the UMWA and to the President's request for seizure powers. Charging that the President had tried to discredit the Taft-Hartley Act, the senator asked for an investigation of the conduct of the case, declaring that he understood the Justice Department had 60 affidavits from coal operators and that none was used in prosecuting the union. As for the seizure proposal, Senator Taft said that it had been poorly drafted and that it would penalize the mine owners while helping the union.

Judging from guarded statements by operators, it seemed probable that no substantial price boosts in bituminous would result from the new wage agreement. With coal markets admittedly hard hit by nearly nine months of off-again-on-again work, producers indicated that they probably would absorb the lion's share of added costs. Pittsburgh Consolidation Coal Co. indicated a likely trend in an announcement March 6 of a price increase at the mine of 10c per ton in most sizes against added costs of 18

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*The Standard*

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- VICTOPRENE SEALING ELEMENT
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- Exceeds A.S.T.M. specifications by 300% in adhesiveness, 26% in tensile strength, 290% in dielectric strength.

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Power end is made of hi-grade semi-steel with a large cover to facilitate inspection. All moving parts are completely self-lubricating. Intermediate shaft runs on adjustable roller bearings. Furnished V-Belt or Gear Drive. Size 5 x 5, Capacity, 50 gals. per minute, 2" suction and 1½" discharge.

This pump uses the hub-proof, cold-resistant FLOOD CITY REVERSIBLE WATER END—standard for replacement purposes in large and small coal mines. Write for more information on this and other Flood City mining Equipment.

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to 30c per ton. However, a boost in anthracite prices from 75c to $1 per ton was expected in view of lower output per man-day in that industry.

### Violence Flares in Fields; Lewis Seeks Labor Unity

While fruitless talks continued in Washington in efforts to reach agreement on contract terms, violence continued in far-flung mining districts. At Summersville, W. Va., 18 alleged pickets were held Feb. 25 for the May grand jury in connection with the beating of three men in a brush with non-union miners. Eleven others were held under peace bonds in the same case. Near Parsons, W. Va., a group of five men was reported to have chopped up the tires of a truck hauling coal from a mine that had signed the "Kentucky" agreement.

In Alabama, three dynamite blasts Feb. 26 did $5,000 damage to the fan, hoist and tipple of a non-union mine and wrecked an Alabama Power Co. substation. In eastern Kentucky, witnesses testified before the Knox County grand jury that roving pickets picked the pockets of men they are alleged to have attacked Feb. 20, when groups of 100 men each stormed down on operations of the Richlands Coal Co. and the Kentucky-Jellico Coal Co., near Barbourville. Thirteen men were injured in the affrays. The gangs were said to have driven picks into parked automobiles, slashed tires and destroyed property. Later, on Feb. 25, a series of shots from a high-powered rifle was fired into the tipple of the West Kentucky Coal Co.'s East Diamond mine. In Utah, non-union mine owners asked for police protection Feb. 22 after a truck driver was beaten and then wounded by gunfire from pickets who blocked the road to the mine.

Other developments on the national labor front were featured by exchanges of money, offers of loans and gropings toward labor unity. On March 6, Mr. Lewis offered to lend the United Automobile Workers, CIO, $1,000,000 to help auto workers through their strike against the Chrysler Corp. The offer also raised the question whether the entire labor movement would aid the Chrysler strikers and join in later drives by the auto workers against other manufacturers. On March 8, Walter Reuther, president, UAW, turned down the loan offer with thanks but stated that his union would welcome any gifts the UMWA might extend. In replying, Mr. Reuther suggested that there should be "maximum solidarity and working unity in labor ranks."

Meanwhile, on March 7, Mr. Lewis mailed back to Philip Murray, president, United Steelworkers of America, CIO, an uncashed check for $500,000 with thanks and a proposal that their two unions and others enter a "mutual aid pact for common defense." Mr.

*The Boringest little animal on earth.

# *Teredo

We call our new core drill the "Teredo" because it will out-bore any other machine of its size. This light, compact, portable core drill will recover cores up to 2¼" in diameter and operate at depths to 600'. It can be mounted on drag skids, jeep, truck or trailer; and powered by air motor, electric motor, gasoline or diesel engine or truck take-off. It's simple, rugged and relatively inexpensive.
Either mechanical screw feed or hydraulic feed can be furnished. Send for Bulletin 30CA.

**ACKER DRILL CO., INC.**
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2

# Here's WHY every mine needs Porto-Power

You need "Porto-Power" because it promotes *safety* . . . it creates spectacular *savings* in time and materials . . . and, because of remote control, it *does more work* than any other hydraulic jack equipment! Standard attachments adapt the all-directional hydraulic ram to a "1001" jobs . . . a few of which are pictured here.

10-ton power, ram and hose hydraulic unit (above)

**STRAIGHTEN DENTED MINE CAR PANELS** — no dangerous blocking. No sledging.

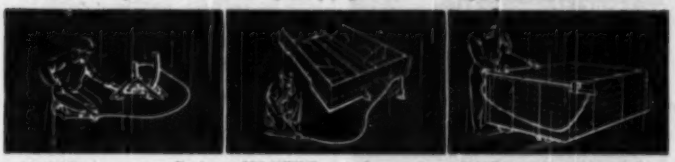
**PUSH OVER ANY SPAN** — steel attachments couple to ram, eliminate hazardous blocks.

**STRAIGHTEN BUCKETS** — apply tons of force exactly where you want it to push out bashes.

**FREE BLUEPRINTS** show how to build a low-cost hydraulic "Porto-Power" press.

**PULL PULLEYS,** wheels, gears. No dangerous, damaging hammering and prying.

**BEND RAIL,** straighten bent parts. Insert or remove bushings, pins, shafts.



**BEND PIPE** the easy way. Equipment is portable—handles all popular pipe and conduit.

**TOE-LIFTING** gets heavy machinery on or off track or onto rollers for moving.

**CLAMP** parts for welding, bolting, etc. "Porto-Power" is also used by rescue crews.

**ONLY $108.80** equips you with this basic S-31 "Porto-Power" ass't. Its 10-ton hydraulic unit and 23 attachments pay for themselves on one or a few good assignments. By modern standards, every mining operation needs safe, efficient "Porto-Power" to lick "1001" tough push, pull, press, bend, spread, lift and clamp jobs. Buy from leading supply houses.

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Rush free literature describing uses of "Porto-Power" equipment in 2, 4, 7, 10, 20 and 50-ton capacities.

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Murray, early in February, had sent the money to assist needy UMWA miners and families during their strike. Two days later, Mr. Murray, acknowledging the check, turned down the Lewis proposal for a mutual aid pact but stated that the steel union would stand behind "every necessary and worthy defense of organized labor."

## Foreign Developments

**CANADA**—Great Britain is understood to be anxious to send Canada some 450,000 tons of anthracite during 1950. Shipments during 1949 were reported at 320,000 tons.

A new contract, affecting some 3,500 miners in the southern Alberta domestic coal fields, was recently signed by representatives of the Domestic Coal Operators' Association of Western Canada and District 18, UMWA (CCL). While the new agreement contains minor changes in working conditions, no change was made in basic wages and hours, which range from $9.79 to $10.74 a day for a five-day week.

**JOHANNESBURG**—South African coal production totaled 34,946,115 tons in 1949, with a marketable production of 28,104,585 tons, both of which represent considerable increases over 1948. Sales of coal totaled 27,569,246 tons in 1949, as compared with 25,968,000 tons in 1948. Import control reportedly is affecting the South African coal trade and resulting in short time at the mines, since fewer ships now are calling at South African ports. The industry previously had been handicapped by a shortage of railway cars.

**TURKEY**—Six members of an American mining team left New York by air March 9 for a 2-yr assignment to assist Turkish government agencies in the $45,000,000 ECA development and mechanization of the Zonguldak coal field, 200 mi east of Istanbul on the Black Sea. The group, all members of the staff of Paul Weir Co., Chicago, will serve as advisers and consultants to E. K. I., the operating organization for the government-owned mines in the area. The party is headed by Lee O. Richards, vice president in charge of foreign operations, and includes James Beeley, assistant chief, John E. Good, mining engineer, John S. Lambright, civil engineer, David Renshaw, electrical engineer, and

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ADDED FEATURE

* Automatic Screw Thread Cleaner, plus

35% to 50% Lighter Weight
Faster Operating
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Increase Production
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8 Ton Timber Jacks
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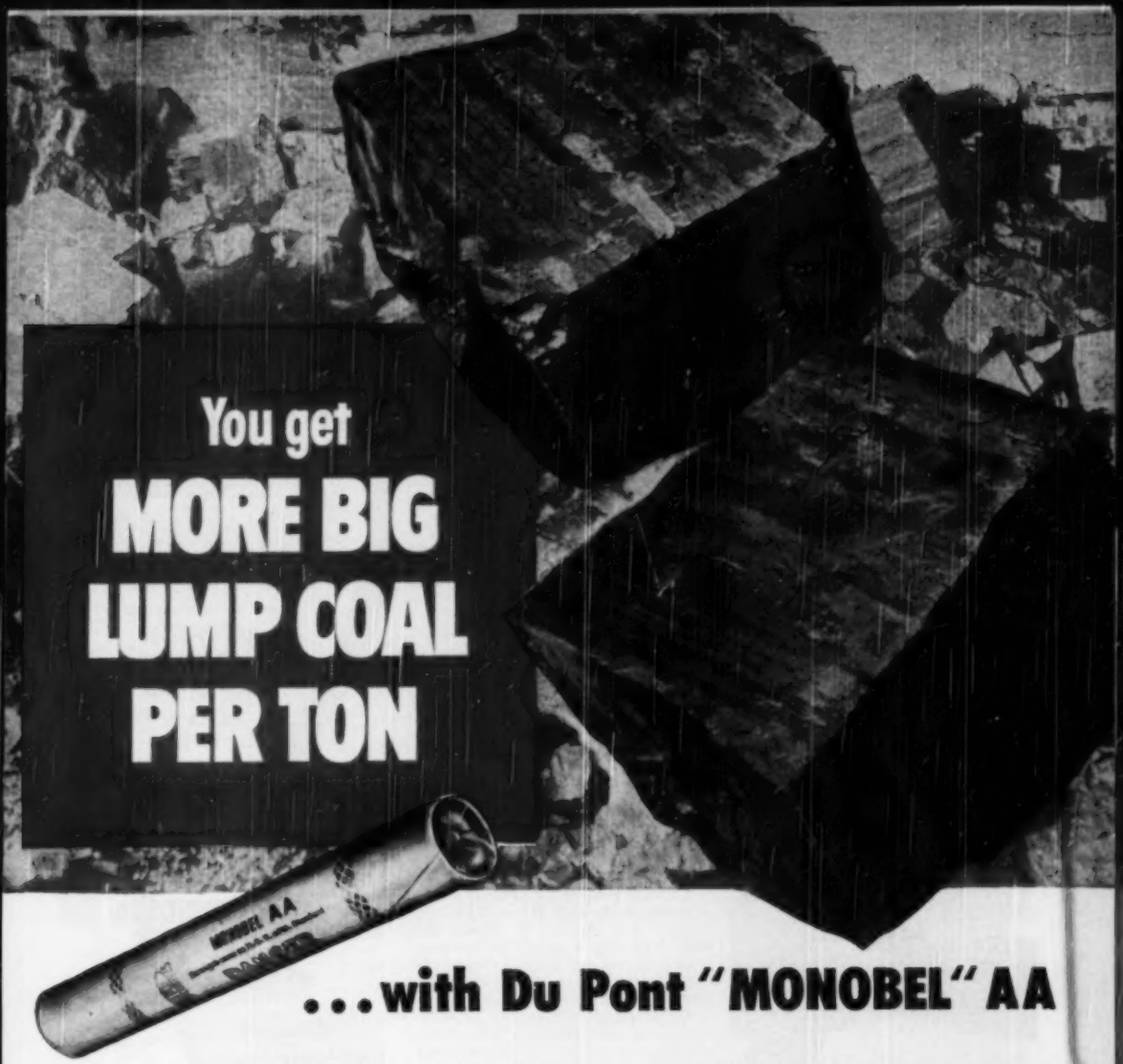


## ...with Du Pont "MONOBEL" AA

"Monobel" AA shoots coal clean and square . . . produces more top-grade big lump coal per ton. It does a quick, economical job in high, hard-shooting seams and in ordinary slate and rock work. That's because "Monobel" AA's high bulk strength and low velocity result in a heaving action that shears coal evenly . . . puts it right where mechanical loaders can get at it easily. And since "Monobel" AA is a water-resistant permissible, it's ideal for either top or bottom cutting even in the wettest mines. Time away from the face is reduced to a minimum, for "Monobel" AA has Class A fumes.

These advantages make Du Pont "Monobel" AA the world's largest-selling permissible . . . one which mine operators rely on when they want to get out more lump coal—quicker. Try "Monobel" AA in your own blasting operations. Your Du Pont explosives representative will gladly give you complete information on this and other popular Du Pont permissibles. E. I. du Pont de Nemours & Co. (Inc.), Explosives Dept., Wilmington 98, Delaware.

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AIRFLOW INDICATOR SWITCH

Here's a dependable mercury tube type switch to be used with battery and bell to sound an alarm in the event of ventilating fan failure. Switch is also available for 110 or 220 volt A.C. and may be used with suitable light, bell or horn. . . . The switch is designed for installation in the exhaust air flow of fan. . . . Write for full descriptive bulletin.

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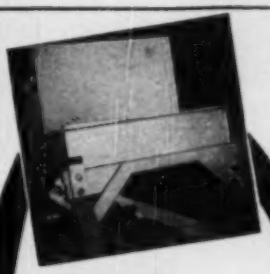
Charles R. Weir, business manager. The organization was employed by the Turkish government in 1949 to study the proposals submitted for modernizing the operations. During the next 2 yr the team will advise the E.K.I. on the erection and installation of all surface facilities and underground equipment needed to modernize the mines. Previous mining in the field, which is the only source of coking coal, has been limited to depths of 150 ft below the surface. Recent exploration has located large reserves at depths up to 2,500 ft. Development of the newer deep openings will include use of conveyor systems and electrification of main passageways.

## Kentucky Student Honored By Old Timers Club

Harry L. Washburn, Lexington, Ky., a senior at the University of Kentucky, recently was honored by the Old Timers' Club as "the engineering student most likely to succeed in the coal industry." An engraved watch awarded by the group was presented to Mr. Washburn by S. M. Cassidy, president, Consolidation Coal Co. (Ky.). Mr. Washburn is president of Tau Beta Pi, honorary engineering fraternity, past president of the university's AIME student affiliate and former member of the engineers' student council.

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While material is smoothly moving along a conveyor, the MERRICK WEIGHTOMETER keeps a continuous and accurate record of weights. Total weight is available at a glance.

Applied to any size belt conveyor, either horizontal or inclined. The weightometer gives a simplified and dependable record of your production, without interrupting the flow of coal.

*Write for Bulletin 375*

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The tough, mildewproof, easy-to-install, light-weight mine ventilation tubing with simple patented couplings. Available in several grades, 8" to 36" diameter. Also Non-Collapsible Mine Vent Tubing for quickly exhausting foul air. Made by makers of ABC Brattice Cloth and Mine Vent Powder Bags.

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## Coal Publications

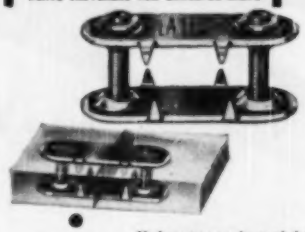
**A Study of Stray Currents in Pennsylvania Anthracite Mines**, by C. F. Weber. U.S. Bureau of Mines, R.I. 4637. 8 pp plus 3 pp of illustrations. 8x10½-in; mimeo. Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh, Pa. To minimize dangers from potential differences between conducting materials underground, the bureau recommends (1) suitable bonds between metallic pipes parallel to the return conductors to keep voltage drop below 0.70 and (2) bonding conducting materials with suitable low-resistance bonds to equalize potential.

**Electric Arc Welding.** Hobart Trade School, Inc., Troy, Ohio. 544 pp. Leatherette; $3. Twenty-eight chapters on procedure and practice of arc welding, divided into five sections as follows: general information, operator-training course, carbon-arc welding and cutting, other welding processes, and welding terms and definitions. Over 600 photos, graphs and charts.

**Papers Presented at the Eighth Conference on Coal Utilization, University of Illinois**, Urbana, Ill., Sept. 27-28, 1948: Engineering Experiment Station Circular Series No. 58. 151 pp. 6x9-in; paper. 75c. Fifteen papers on coal production and preparation,


PLATEGRIP

PLATE FASTENERS FOR CONVEYOR BELTS



- Make strong dust-tight, water-tight joints in belts of any width. Special design spreads tension uniformly across belt, allow natural troughing of belt and assures smooth operation over flat, crowned or take-up pulleys. Sizes for belts of [illegible] to 1¼" thickness. *Write for Catalog Sheet.*

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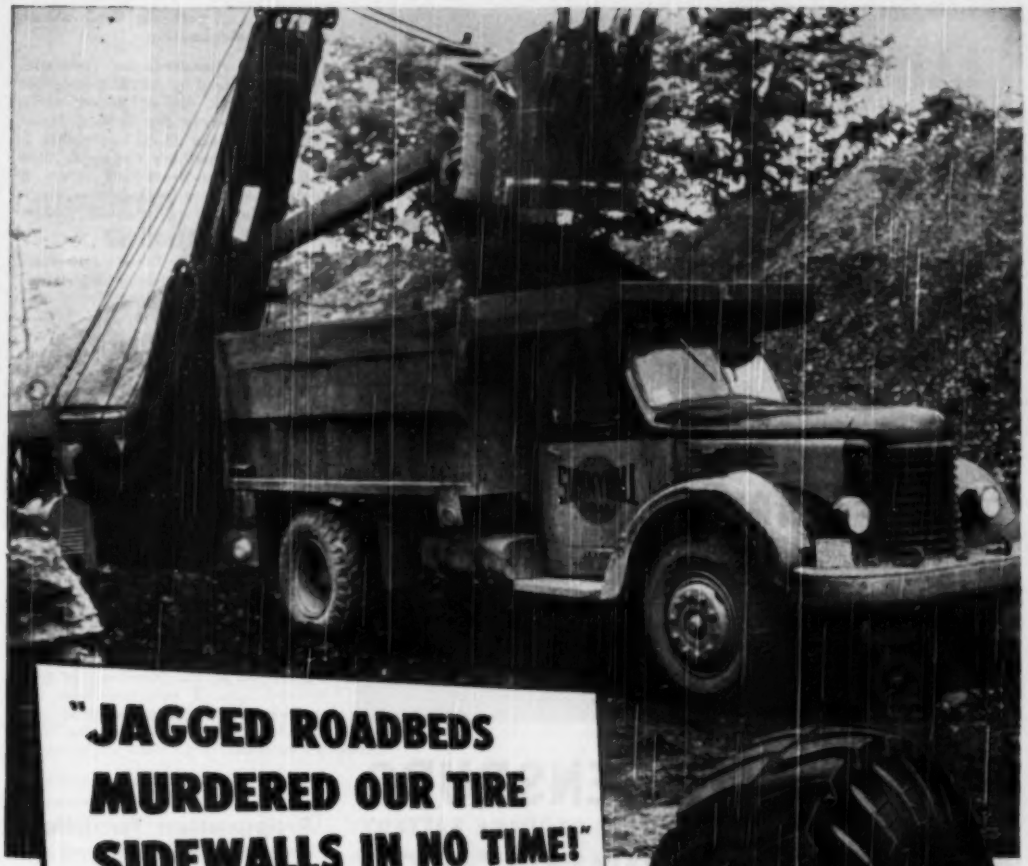

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"The roads my trucks travel are the toughest kind. And the biggest trouble with tires I have used has been sidewall wear. Now, in U. S. Royal Lug Traction Tires, I have strong and lasting sidewalls."

You'll want Lug Tractions for your operation, too—sharp, massive lugs for deep penetration . . . lugs and shoulder designed to resist cuts and bruises . . . sturdy center running rib that means smooth rolling—resistance to side-slip. And your U. S. Royal Distributor has a tire maintenance plan especially designed for you—call him today!

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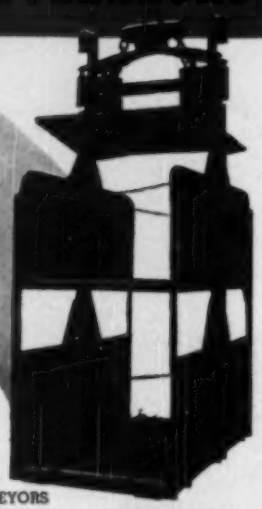
Portal to portal time can be speeded with the all-steel Lepley 2-deck Man Cage, custom-made up to and including 90 men capacity. Bottom deck is also equipped with rails for handling material cars during the day's operation. Ruggedly built, and complete with the Lepley "wedge-type" safety dogs, this man cage can be supplied to conform with the laws of any state. Write for complete information.



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Oil-tight, leak-proof transmission. Use regular auto oil; change every 6 months.

Strong. Simple. Low maintenance cost.

Extra-long journal springs assure better trackability.

Large motor, to assure more horse power per ton weight of locomotive.

Can be equipped with hydraulic brake.

This locomotive being used for main line haulage at the Blacksmith Coal Company, Novinger, Missouri. This is a 4½ ton locomotive, operating on 30" gauge track. This locomotive built from 3½ to 10 tons — either single or double motor drive — 16" to 56½" track gauge.

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equipment, air pollution, fuel markets and coal salesmanship.

**A.S.T.M. Standards on Industrial Water,** prepared by ASTM Committee D-19. 133 pp. 6x9-in; paper. $1.75, American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Testing methods for water used industrially for generating steam or for processing or cooling; also methods for examining deposits formed from such waters.

**Briquetting of Dried Low-Rank Western Coals,** by C. C. Boley and Neal Rice. Natural Resources Research Institute, University of Wyoming, Laramie, Wyo. Bulletin No. 3. 76 pp. 6x9-in; paper. Price not quoted. Pilot-plant facilities, operation and methods used in drying and briquetting one bituminous and four subbituminous coals; comparison of briquets with parent coals, briquetting economics.

**Investigation of Lower Coal Beds in George's Creek and North Part of Upper Potomac Basins, Allegany and Garrett Counties, Md.,** with maps, by A. L. Toenges, L. A. Turnbull, Lloyd Williams, H. L. Smith, H. J. O'Donnell, H. M. Cooper, R. F. Abernethy and K. W. Waage. U.S. Bureau of Mines, T.P. 725. $4.75, Supt. of Documents, Govt. Printing Office, Washington 25, D. C. Discovery of 600,000,000 tons of semi-smokeless coal in 10 coal beds buried below the two that have provided most of the field's production.

## Preparation Facilities

**Pickands, Mather & Co.,** Mather colliery, Greene County, Pennsylvania —Contract closed with Deister Concentrator Co. for three SuperDuty Diagonal-Deck No. 7 coal-washing tables to clean ¼-inx48-mesh fines and one three-way Model 109 Concenco revolving feed distributor.

**Marriott-Reed Coal Co.,** Columbia, Mo.—Contract closed with McNally-Pittsburg Mfg. Co. for complete coal-preparation plant for washing 125 tph of 6x0-in coal, with classification of domestic and stoker grades, to be delivered to truck bins; incorporating McNally-Norton automatic washing equipment with complete dewatering and water-clarification system.

**Jamison Coal & Coke Co.,** No. 21 mine, Hostetter, Pa.—Contract closed with Robert Holmes & Bros. (by Industrial Engineering & Construction Co.) for five Baughman Verti-Vane thermal coal dryers to reduce moisture of minus-1-in coal at an approximate feed rate of 200 tph.

**Charbonnages d'Hensies - Pommeroeul,** Belgium—Contract closed with Western Machinery Co. (through Agence Miniere et Maritime S. A.,

for modern mining

# YARDLEY "TRU-SIZE" Plastic M Pipe

Illustration shows a 200-ft. coil of 2" pipe. Approximate weight, 90 lbs.

End corrosion troubles for good. Use Polyethylene plastic pipe that is resistant to acids and alkali. It is light, flexible and tough . . . withstands normal operating pressures and temperatures . . . cuts installation costs up to 60% . . . requires minimum maintenance.

Yardley M pipe comes ready to use with accessories illustrated. Sleeve-type outside couplings quickly attached with stainless steel clamps. Warehouse stocks near most mining areas.

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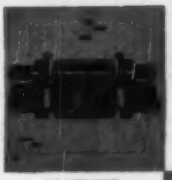

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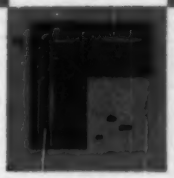

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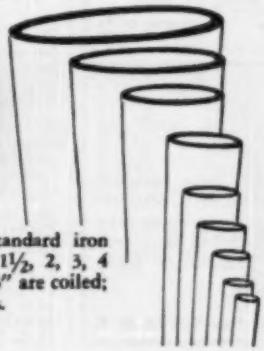

Plastic M pipe comes in standard iron pipe sizes: ½, ¾, 1, 1¼, 1½, 2, 3, 4 and 6 inches. Sizes through 3" are coiled; 4" and 6" in straight lengths.

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Belgium agents) for two heavy-media separation plants, one to treat 200 tph of ¼x3¼-in rom coal and the other, 100 tph of 16-meshx¼-in rom. The 200-tph plant is a twin-cone installation and is reported to be the first heavy-media plant treating coal in which the coal is processed in two different separatory vessels using different specific gravities. The first separation will be a high-ash coal and refuse for reject, using an intermediate-gravity medium. The float coal will be fed to the second cone having a lower gravity medium, with the resulting products a high-ash coal as sink and a low-ash coal as float. The contract followed installation in 1949 of a 50-tph 3-C Mobil-Mill, the first Western Machinery plant to be used in Europe.

**Lumaghi Coal Co.**—Contract closed with Jeffrey Mfg. Co. (by Templeton-Matthews Co.) for Baum Jig; capacity, 300 tph, 6x0-in coal.

**Chicago, Wilmington & Franklin Coal Co.**—Contract closed with Jeffrey Mfg. Co. (by Allen & Garcia Co.) for one-compartment diaphragm jig and Baum jig; capacity, 340 tph, 6x7/16-in coal.

**Bethlehem Collieries Corp.**—Contract closed with Jeffrey Mfg. Co. (by Roberts & Schaefer Co.) for Baum jig; capacity, 200 tph, 6x0-in coal.

---


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Mr. M. M. Hahn, shown above, is responsible for specifying, buying or otherwise influencing the purchase of mining machinery, equipment and supplies for The Simpson Creek Collieries Co. Inc., New York.

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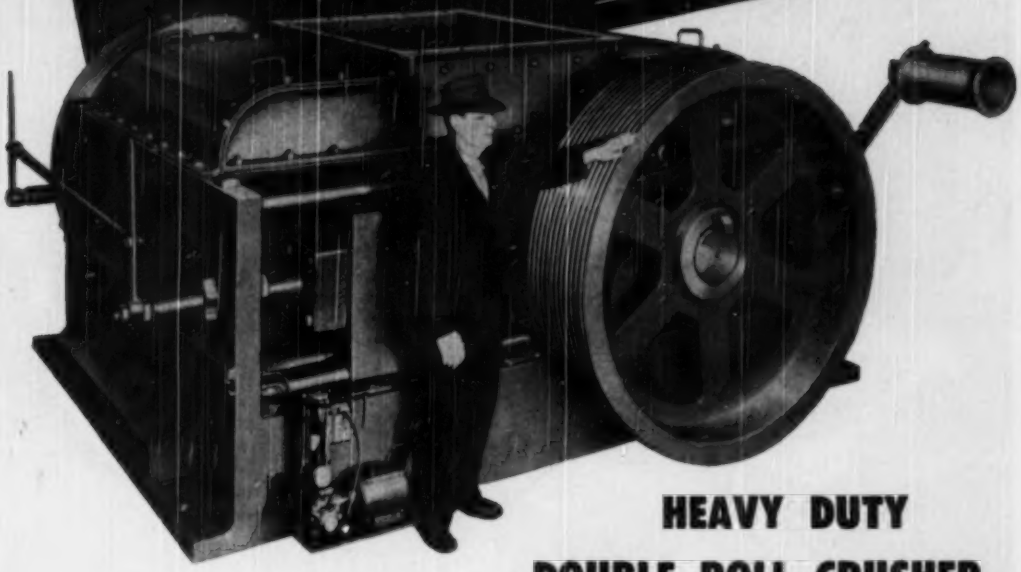

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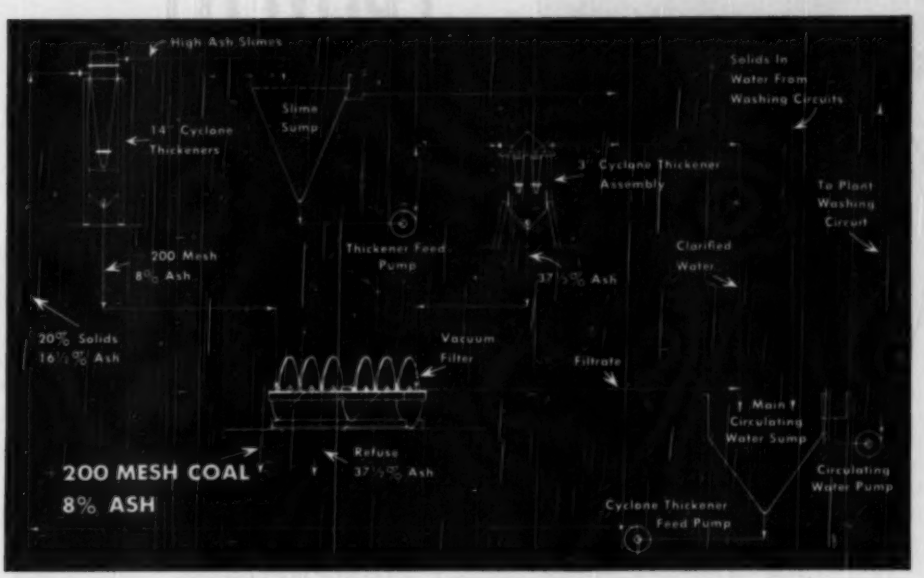


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Now you need not accept useless, fatiguing weight in order to get a dependably strong wrench. Through stress analysis of every inch, the new Roxco was designed to put *extra* metal *where heavy stresses come*. And, to take out metal where it does *not* count.

The result is not only the handiest pipe wrench a man ever put to work, but also a wrench so strong that it exceeds, by a good margin, Federal Spec's for Heavy Duty Pipe Wrenches, Type II, GGG-W-651a.

So superior is this new wrench . . . so carefully quality-controlled . . . that every Roxco is individually *Registered* by number. And *every* part is *guaranteed* against breakage in any normal heavy duty use! The nine points below show why any wrench buyer and user will want the lighter, easier-to-work-with Roxco to boost efficiency . . . reduce tool costs. Order Roxco, now. Or send for folder and names of distributors.

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**3. Uniformity of Jaw Hardness and Strength:** Both movable and insert jaws are of drop-forged alloy steel. Teeth are hardened by automatically-timed, localized induction process at wear points, yet the tough core of jaws is retained for strength.

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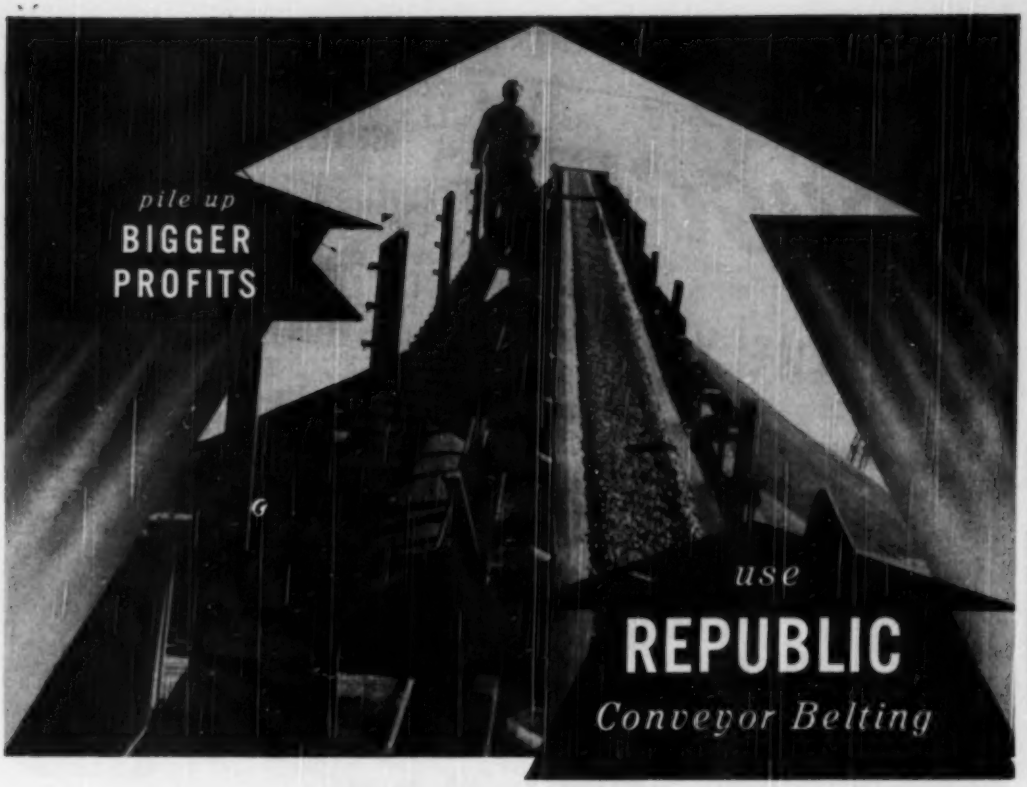


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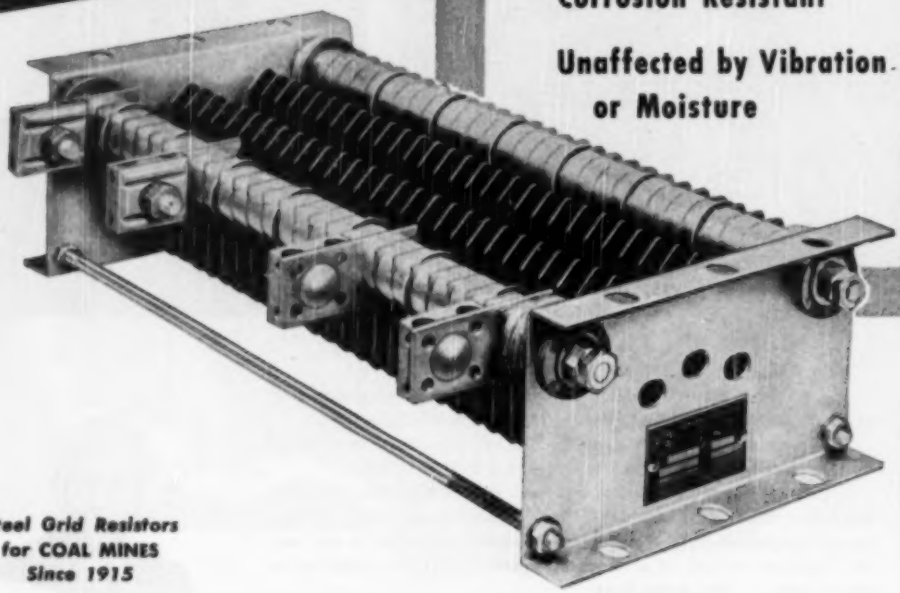

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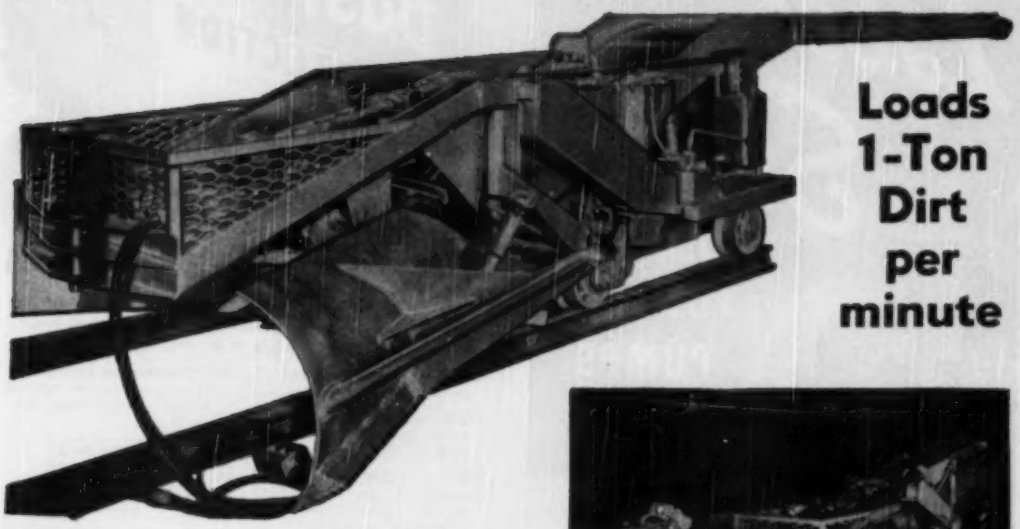

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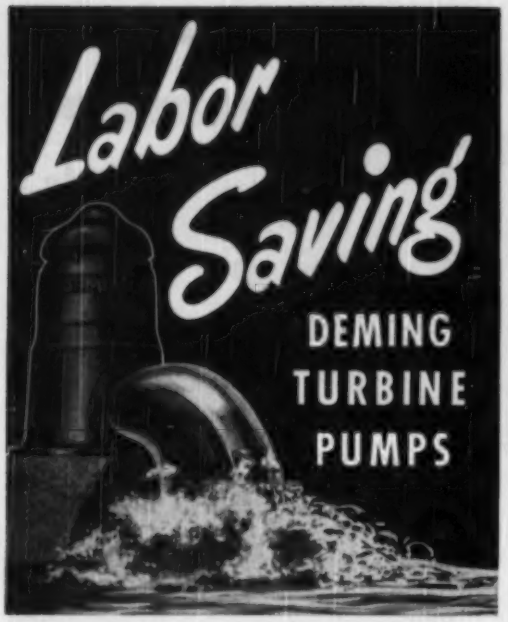


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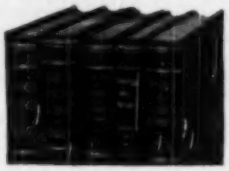

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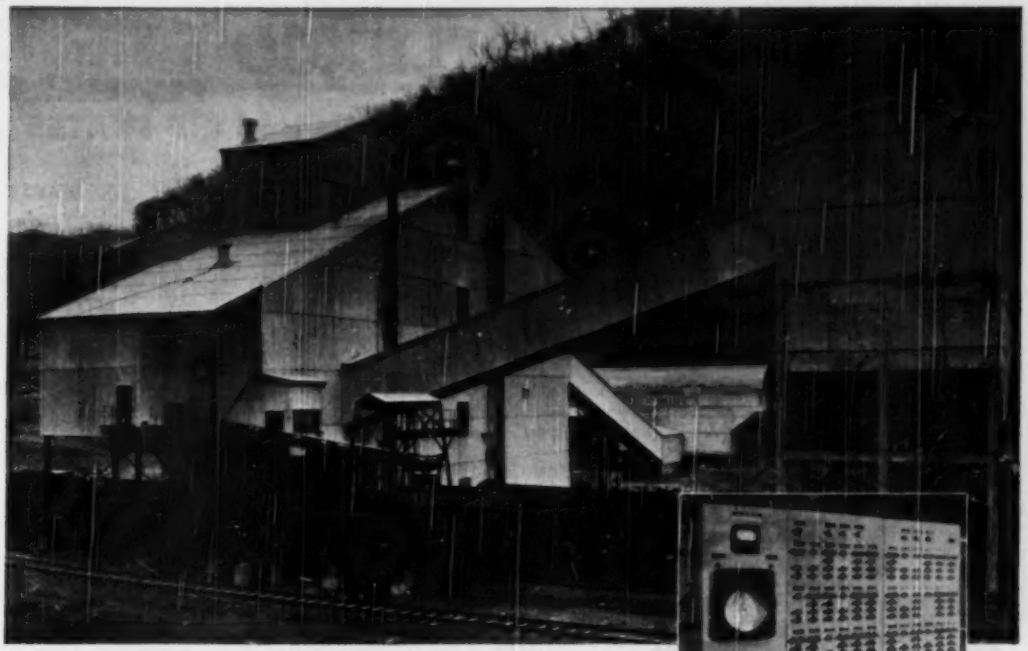

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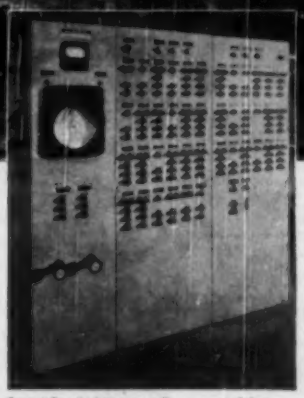

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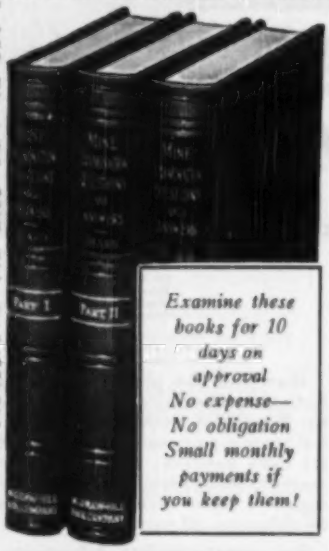


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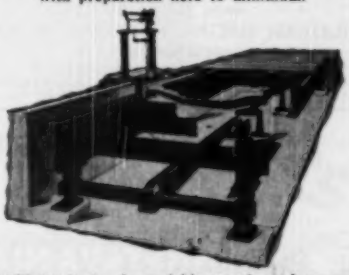

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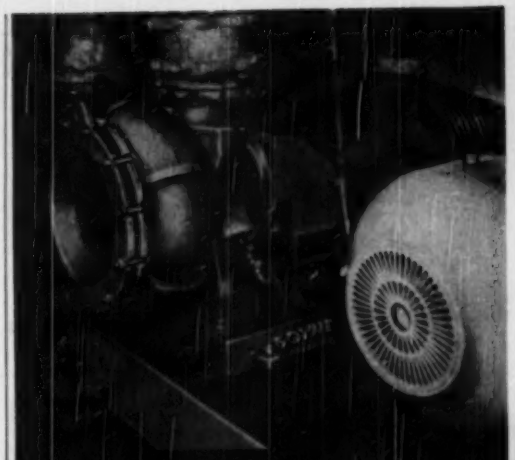

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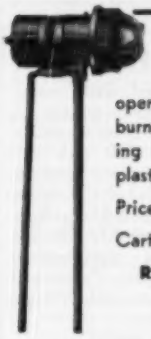

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|---|---|---|---|---|
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**MIDWEST STEEL CORP.**
Gen. Off.: CHARLESTON 21, W. VA.
Warehouses
CHARLESTON, W.VA.
KNOXVILLE, TENN. • PORTSMOUTH, VA.

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## RELAYING RAIL
*All Sizes*
Track Accessories
**LEFTON INDUSTRIAL CORP.**
**Genl. Office: 212 Victor St.**
**St. Louis 4, Mo.**

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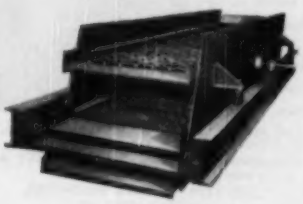
# VIBRATING SCREENS - CONVEYORS - FEEDERS
# SCALES - CRUSHERS - CONVEYOR IDLERS
***Guaranteed Equipment — Immediate Shipment***

### VIBRATING SCREENS



100 machines in stock; screen sizes 2' x 5' to 5' x 14'; 1 to 5 decks. Positive throw eccentric shaft types; also eccentric weight types.

Prices from ..... .....$390.00

### HEAVY DUTY PLATE AND PAN FEEDERS

15 to 25 ton per hour capacity.....$150.00
25 to 60 ton per hour capacity..... 190.00
50 to 100 ton per hour capacity..... 275.00
100 to 175 ton per hour capacity..... 800.00

### HEAVY DUTY FLIGHT CONVEYORS

Any length. Flights up to 6" x 24". All welded structural and sheet steel. Heavy duty, double guided chain. Prices from $160.00.

### PORTABLE FLIGHT CONVEYORS

Mounted on rubber tires on adjustable undercarriage. All welded structural and sheet steel; double guided heavy duty chain; steel flights to 6" x 24". Electric or gasoline power. Priced from $450.00.

### TRUCK SCALES

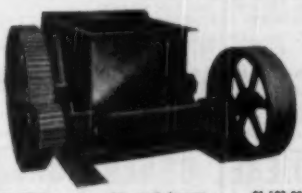
15 Ton Truck Scales.....$498.00
20 Ton Truck Scales..... $10.00
25 Ton Truck Scales..... $45.00

Others to 50 ton capacity. All scales complete with structural steel weighbridge. New parts and new weighing beams for all makes of motor truck scales.

### DOUBLE ROLL COAL CRUSHERS

Take large lump feed and reduce it to your customers' specifications, in sizes ranging from ¾" to 6". Capacities 20 to 500 tons per hour. Double roll and single roll models.

### SINGLE ROLL COAL CRUSHERS



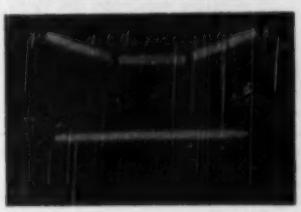
65 TPH crusher with steel hopper.....$1,195.00

### CONVEYORS — PICKING TABLES

Troughing idler conveyors—picking tables. Any length, belt widths to 60".

Prices from ..... .....$385.00

### TROUGHING IDLERS AND ROLLERS



All steel. Interchangeable with other well-known makes. Replaceable precision ball bearings with alemite fittings. No bearing adjustments required. Easy to start and will run in cold weather. Rust-proof ball races; maintenance is negligible. Build your own conveyors: we have standard sections, head and tail pulleys, take-ups, drives, idlers, spood reducers, shearel, belting, etc.

3-roll Troughing Idlers for these sizes:

| | | | |
|---|---|---|---|
| 14" belt | $18.00 | 24" belt | $21.40 |
| 16" belt | 19.00 | 30" belt | 23.00 |
| 18" belt | 20.00 | 36" belt | 25.00 |
| 42" belt | | | $34.00 |

1-roll Return Idlers for these sizes:

| | | | |
|---|---|---|---|
| 24" belt | $8.25 | 36" belt | $ 9.75 |
| 30" belt | 9.00 | 42" belt | 10.50 |
| 48" belt | | | $11.25 |

**More than 3000 mines and quarries have modernized with Bonded equipment.**

## BONDED SCALE & MACHINE COMPANY
**2190 South Third Street, Columbus 7, Ohio**
**Phones: Garfield 2186; Evenings: University 2832; Douglas 2438.**

## SUBSTATION EQUIPMENT

1—Practically new 300 KW Mine Type, 275 volt DC, 2300/4000 volt AC, General Electric Rectifier and several 150 KW, 200 KW, and 500 KW Late Type Motor Generator Sets and Rotary Converters, equipped with all necessary appurtenances.

### LOADING MACHINES, 250 VOLT DC

6—Jay 14-BU.
6—Jay 8-BU.
11—Jay 7-BU.
6—Jay 11-BU.
5—Jay 13-BU.
6—Jeffrey L-460.
3—Jeffrey L-500.
3—Jeffrey L-600.
3—Goodman 400.
3—Goodman 300.

### STEEL TIPPLES AND WASHERS

1—6-track McNally Pittsburgh Steel Tipple complete with McNally Pittsburgh No. 8 Washer, capacity 250 to 300 tons per hour.
1—3-track Steel Tipple with McNally Pittsburgh No. 5 Washer, capacity 250 tons per hour.
These Tipples and Washers are complete installations. Can be used for slope, drift, strip, or shaft mines.

### LOCOMOTIVES, 250 VOLT DC, BALL BEARING MOTORS

2—15-ton Goodman, Type 30-A04C
3—15-ton General Electric, Type HM820.
2—10-ton Jeffrey, Type MH110
3—13-ton Westinghouse, Type 301C
5—10-ton Goodman, Type 34-B
5—10-ton Westinghouse, Type 907C
5—6-ton General Electric, Type HM819
4—8-ton Westinghouse, Type 905C
4—8-ton Goodman, Type 32A14T
4—4-ton General Elec. type GE21

Frank J. Wolfe  Sheldon J. Wolfe

### LATE TYPE CUTTING MACHINES, 250 VOLT DC

5—Jeffrey 20-U Permissible Type Track Cutters.
3—Jay 7-AU Permissible Type, Universal.
3—Goodman 212-AA Low Vein.
7—Goodman 112-AA Universal.
10—Jeffrey 35-BB Permissible Type.
9—Jeffrey 34-L Late Type Longwall.
4—Sullivan 10-B Low Vein.

### LOADING MACHINES, 220/440 VOLT AC

4—Jay 8-BU, new in 1940 and 1957.

### LATE TYPE CUTTING MACHINES, 220/440 VOLT AC

5—Goodman 1263 on Tip Turn Trucks.
5—Goodman 112CLS.
4—Goodman 512CLS on Tip Turn Trucks.
9—Sullivan 7-B on Tip Turn Trucks T-S.

WE SPECIALIZE IN BUYING OUTRIGHT COMPLETE MINES THAT ARE GOING OUT OF BUSINESS OR FROM RECEIVERS IN BANKRUPTCY, ADMINISTRATORS OF ESTATES, ETC.

## COAL MINE EQUIPMENT SALES COMPANY

FRANK J. WOLFE — Since 1912 — SHELDON J. WOLFE
306-307 BEASLEY BUILDING • LONG DISTANCE PHONE 34 • TERRE HAUTE, INDIANA

## TRANSFORMERS FOR SALE

3—1000 KVA A-Ch 13800-2400
3—500 KVA G-E 2400-240/480
3—500 KVA G-E 11500-2300/4000Y
1—400 KVA G-E 13200-120/240
3—333 KVA G-E 33000-2300/4000Y
3—333 KVA G-E 13800-120/240
3—333 KVA G-E 13800-230/460
3—333 KVA G-E 11000-2300/4000Y
3—333 KVA G-E 2400/4160Y-240/480
1—250 KVA G-E 6900/11950Y-230/460
3—200 KVA G-E 6900/11950Y-230/460
3—200 KVA G-E 6600/11430Y-2300
3—150 KVA G-E 22000-2300/4000Y
3—150 KVA G-E 11000-2300/4000Y
3—150 KVA G-E 6900-460/230
3—150 KVA L-M 2400/4160Y-120/240
Many other items in stock

## TRANSFORMERS WANTED

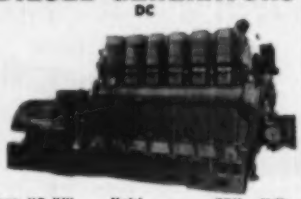
Reliable rewind and repair services on all makes of transformers

## THE ELECTRIC SERVICE CO.

Cincinnati 27, Ohio

## DIESEL GENERATORS

DC



| Guss. HP | KW | Model | RPM | Volts |
|---|---|---|---|---|
| *2 450 | 300 | Enterprise DSG-6 | 450 | 120/240 |
| 1 385 | 250 | Ingersoll Rand 6 | 600 | 250 |
| 3 275 | 150 | Ingersoll Rand 6 | 900 | 250 |
| **6 162 | 100 | Superior GDB-6 | 1200 | 120/240 |
| 3 150 | 100 | General Motors 3-268A | 1200 | 120/240 |
| *2 90 | 60 | General Motors 6-71 | 1200 | 300 |

*NEW.
**Low price on "as is" basis. A.C. Units Available.

## Diesel Motors CORPORATION

## AVAILABLE 'NOW' USED D.C. MOTORS

7½ h.p. G.E. 200 v. 450/1200 r.p.m.
7½ h.p. G.E. 1 v.—600/1200 r.p.m.
7½ h.p. G.E. 220 v.—1150 r.p.m.
5 h.p. C-W Vertical, 230 v.—900 r.p.m.
5 h.p. G.E. v.—150/1800 r.p.m.
5 h.p. West 220 v.—635 r.p.m.
1 h.p. G.E. 220 v.—625/2100 r.p.m.
1 h.p. G.E. 220 v.—1150 r.p.m.

PARTIAL LISTING—INQUIRIES SOLICITED.
NEW—USED A. C. MOTORS—ALL SIZES.

## FALK MACHINERY COMPANY

15 Ward St., Rochester, N. Y.
Baker 3887

*NEW and REBUILT STORAGE BATTERY*

## LOCOMOTIVES

3½ to 10 Ton 12" to 56" Track Gauge.
GREENSBURG MACHINE CO.
Greensburg, Pa.

2—Goodman Style G20B77 permissible Shaker Conveyors, latest type, with manual type HAD duckbill and 20 HP Westinghouse AC motor, 3 phase, 60 cycle, 220 volt, 1160 RPM.

without line troughs.....$2,600.00 each
with 300' new line troughs..... 4,350.00 each

The above equipment is to include all usual accessories and is guaranteed to be in A-1 condition. New in 1943. It is offered subject to prior sale, f.o.b. Sunnyside, Utah.

KAISER STEEL CORPORATION
Sunnyside Mine
Sunnyside, Utah

Euclid 15-ton rear dumps (6); bottom dumps (11).
Walking draglines, 15-yd., 8-yd., 3-yd.
Shovels, 1¼ to 10-yd., elec., diesel, steam.
Bucyrus 120B 6 and 5-yd. shovels, elec., steam.
Locomotives, 7 to 50 tons, diesel, stm. (14).
Porter, Vulcan 16-ton steam 56" ga. locomotives.
Link Belt Roto Louvre, 10'x30' dryer.
Allis-C. 72" rev. scalper screens (2) 16'-20' lg.
H-Nyle Swivel Feed sil., 5½-yd., 6SB, 8SB.
H. Y. SMITH CO., 525 N. 8'way, Milw. 2, Wis.

## EQUIPMENT IN STOCK

**MINING MACHINES:**
Jeffrey, Goodman, Sullivan, D.C. and A.C., 3 phase.
**LOCOMOTIVES:**
Jeffrey, Westinghouse, General Electric, Goodman, Ironton.
**SUBSTATIONS:**
Motor Generator Sets, Rotary Converters.
**SPARE ARMATURES:**
For Locomotives, Machines, Rotary Converters and others.
**MOTORS:**
D.C. and A.C., 3 Phase.
1—Synchronous 145 H.P., 600 RPM Western Electric type ATA12-150 440 volt, can be rewound—direct connected exciter.
**TRANSFORMERS:**
3 phase and single phase, also rotary.

NEW and REBUILT
MOTORS
GENERATORS
TRANSFORMERS
1 to 1500 H. P.
ELECTRIC EQUIPMENT CO.
ROCHESTER 1, NEW YORK

## R. T. McNEES

COAL MINE EQUIPMENT
NORTON, VIRGINIA
Hotel Norton — Phones 608 & 300

### FOR SALE

1—17-12¼ La-Del Shaker Conveyor.
2—41 W Jeffrey Chain Conveyors.
1—41 AM Jeffrey Chain Conveyor.
1—30G Jeffrey Chain Conveyor.
1—MH 90 Jeffrey Locomotive with cable reel.
1—50 HP Goodman Standard New 5' Bar & Chain.
1—12 BU Jay Loader Permissible Machine.
Mason Mine — Coshocton, Ohio

### FOR SALE

Bucyrus-Erie 200-B electric shovel, mounted on caterpillars; 10 cu. yd. bucket; shovel in excellent condition; has been used loading coal in strip mine. Reason for sale, we have installed 17 cu. yd. Bucyrus-Erie 550-B. Specifications and photographs sent on request.

NORTHWESTERN IMPROVEMENT COMPANY
Colstrip, Montana

MACHINE TOOLS — CONVEYORS — LOADING MACHINES — PUMPS — COMPRESSORS — GENERATORS — WELDERS — AERIAL TRAM — LARRY, SLATI — BOOM LOADING — BIT SHARPENERS, SULLIVAN—CIRCUIT BREAKERS, AUTOMATIC—AND MANUAL—SWITCHBOARDS — CONTROLLERS, DRUM, A.C. & D.C. — COMPENSATORS, AUTOMATIC AND MANUAL — STARTERS, SYNCHRONOUS.

## GUYAN MACHINERY CO.

LOGAN, WEST VIRGINIA

### FOR SALE

1—¾ to 10 yd. Electric Shovel, Marion Model 360; Rail-truck mounted; approx. 500 tons. Location, New York area.
Price $32,000

FS 2418, Coal Age,
520 N. Michigan Ave., Chicago 11, Ill.

## COAL MINE EQUIPMENT — NEW REDUCED PRICES

**GENERATORS — DIESEL**
1—D-13000 Caterpillar Diesel Generator, 75 KW, 440 volts AC
1—D-4400 Caterpillar V-belted to 30 KVA, AC Generator

**SCREENS**
1—4'x8' Hum-mer, Tandem, Single Surface
1—30"x6' Trommel
1—30"x15' Trommel
1—48"x16' Revolving
1—48"x8' Trommel

**COAL CRUSHERS**
1—36" American Ring Type

**FREIGHT ELEVATORS**
1—Nock & Garside Continuous, Push-button Type, Capacity 3000 lbs. Traveling Speed 285 RPM, direct connected to 25 HP Motor, complete with counter weights, wire rope, etc.

**FLOTATION MACHINES**
2—No. 24, 8-cell, Denver "Sub-A" Flotation Machines, wood tanks, rubber impellers, 43"x43" cells, motorized

**BINS & WATER TANKS**
2—18'x20' Wood Stave Bins
1—Wood Stave Water Tank 20' dia. x 12' high

**MAGNETIC PULLEYS**
1—24" Belt Feeder, 5'6" centers, with 26" face x 24" dia. Dings Magnetic Pulley, R. C. Drive to 2 HP Gear Motor, complete with motor generator set
2—26" face x 24" dia. Dings 250 volt DC Magnetic Pulleys

**LARRY CARS**
4—Connellsville Larry Cars, Trolley Operated, 6 Ton Capacity

**BELT CONVEYORS**
1—14", 20' centers, new belt, V-belted to 1½ HP Motor
1—42", 20' centers, Motorized

**TROLLEY LOCOMOTIVES**
2—7½ Ton Goodman, 36" gauge, 250 volts DC

**FILTER**
1—4', Six Disc Eimco Filter, complete with vacuum equipment —motorized

**WAGON DRILLS**
1—Ingersoll-Rand, with drifter, all on pneumatic tires, used about 6 months.
1—Sullivan #1W-6, with drifter, on steel wheels, AC Motor

**PIT CARS**
150—Card Iron Works R.B. Pit Cars, 36" gauge, 1.7 Ton Cap.
35—Card Iron Works R.B. Pit Cars, 36" gauge, 1 Ton Cap.

**MISCELLANEOUS**
1—90 cu. ft. C. S. Card Rocker Dump Car
1—CE-7 Sullivan AC Coal Cutter
Drag Chain Conveyors of various widths and lengths
1—Ingersoll-Rand 3-drum Slusher Hoist with built-in 30 HP AC Motor
6" Spi-weld and 6" wood pipe
Ingersoll-Rand Cent. Motor Mtd. Pumps
Triplex Pumps—Platon Pumps
Deep Well Pumps—Wilfley Sand Pumps
Hydroseal Pumps—Turbine Pumps
New Brattice Cloth
1—18"x12' Manierre Type Box Car Loader—Motorized
AC and DC Motors—1 HP to 40 HP
1—6' dia. x 5' high Open Steel Tank
1—3" Dorrco Duplex Pressure Diaphragm Pump with Gear Motor
1—Rock Duster, 250 volts DC.
Enclosed Safety Switches
Steel Lockers
Fuel Oil Tanks

***WRITE FOR BULLETIN NO. 10***

# FLORENCE MACHINERY AND SUPPLY COMPANY

**Suite 904, Equitable Bldg.** **C. J. Parrish, Mgr.** **Denver 2, Colorado**

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**"UNUSUAL OPPORTUNITY"**

**AT LESS THAN 25% OF ORIGINAL COST**

**RUBBER CONVEYOR BELTING**
(Mfd. by Goodyear Tire & Rubber Co.)
**48" and 60" Wide**

Slightly Used—Excellent Condition
Extremely Low Priced
Can barely be distinguished from Brand New
1,660 Ft. 48" x 7 Ply, 48 Ounce Duck 1/16" Rubber Top Cover x 1/16" Bottom Cover.
1,700 Ft. 60" x 9 Ply, 48 Ounce Duck, 1/16" Rubber Top Cover x 1/16" Bottom Cover.

**Will sell all or part**

***Samples upon request. Inspection if desired in New York City.***

**Also Available**

**BRAND NEW RUBBER CONVEYOR BELTING**

***GUARANTEED FIRST GRADE***
***LOW PRICED***

2,600 Ft. 36" x 6 Ply, 32 Oz. Duck, 3/16" top x 1/16" bottom covers.
1,800 Ft. 30" x 5 Ply, 32 Oz. Duck, 1/16" top x 1/16" bottom covers.
2,000 Ft. 24" x 5 Ply, 28 Oz. Duck, 1/16" top x 1/32" bottom covers.
2,500 Ft. 18" x 4 Ply, 28 Oz. Duck, 1/16" top x 1/32" bottom covers.
*If interested in other sizes, please advise*

**PHONE WIRE WRITE**

**CARLYLE RUBBER COMPANY, INC.**
**62-66 Park Place New York 7, N. Y.**
**Phone: Digby 9-3810**

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**MOTOR GENERATORS**
1—500 KW G.E. Syn. 275 V. 900 RPM
1—400 KW WEST. Syn. 575 V. 720 RPM
2—300 KW G.E. Syn. 275 V. 1200 RPM
1—200 KW G.E. Syn. 275 V. 1200 RPM
1—150 KW G.E. Syn. 275 V. 1200 RPM

**ROTARY CONVERTERS**
2—300 KW WEST. Syn. 275 V. 900 RPM
1—300 KW G.E. Syn. 575 V. HCC 1200 RPM

**GENERATORS & ARMATURES**
2—50 KW G.E. 575 DLC 1200 RPM Generators
1—600 KW G.E. 275 V. MPC 900 RPM Armature
1—300 KW G.E 575 V. HCC 1200 RPM Armature

**TRANSFORMERS**
3—100 KVA G.E. 2200/4400/7620—220/440, 2200/4400/900—220/440, 2400/4800/8325—240/480

**LOCOMOTIVES**
2—30 T JEFFREY 250 V. MH-77 48-36" Ga.
1—30 T JEFFREY 250 V. MH-77 48-36" Ga.
3—13 T JEFFREY 250 V. MH-2110 42-32" Ga.
1—13 T G.E. 250 V. HM-827 44-36" Ga.
1—18 T JEFFREY 250 V. MH-110 44-32" Ga.
1—4 T WEST. 250 V. ML-906C 44-36" Ga.

**LOCOMOTIVE MOTORS**
2—JEFFREY 250 V. MH-77, Ball Bearing
2—G.E. 500 V. HM-828-A, Ball Bearing
2—WEST. 250 V. ML-906-C, Ball Bearing
2—WEST. 250 ML-907-C, B.B. (New)
2—WEST. 250 V. ML-906-C, Ball Bearing
2—WEST. 250 V. ML-904-B, B.B. (New)
1—WEST. 250 V. ML-901-C, Ball Bearing
2—G.E. 85/125 V. HM-828-A, Ball Bearing

**LOCOMOTIVE ARMATURES**
MH-77-250 V. MH-78-500 V. 906-C-500 V.
906-C-250 V. 903-B-250 V. 901-C-250 V.
158-C-250 V. HM-828-A-500 V.
HM-828-A-85/125 V.

**WALLACE E. KIRK COMPANY**
**501 GRANT BUILDING** **PITTSBURGH 19, PENNSYLVANIA**

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# Electrical Equipment

Converters, Motor Generator Sets, A.C. and D.C. Motors, Control Equipment and Transformers, Meters and Relays.

**C. B. LOCKE CO.**
P.O. BOX 3227, TEL. 36-136
CHARLESTON, W. VA.

**NEW and REBUILT**

**MOTORS**
150 HP. 900 RPM. Elec. Mach., 220/3/60 Syn.
125 HP. 1800 RPM. West SK 200 v. D.C.
50 HP. 1200 RPM. Gr. Wh. 220/440/3/60 Ind.
75 HP. 900 RPM. Elec. Mach., 220/3/60 Syn.
75 HP. 1800 RPM. US 220/440/3/60 Ind.
3, 7½, 10 and 15 HP. AC & DC TEFC & Open.

Send Us Your Transformer Inquiries.

**SPECIAL—300 KW—G. E.—1200 RPM—MG SET—3300 V. AC.**

**SYNCHRONOUS ROTARY CONVERTERS**
6 ph. 60 cycle

| Qu. | KW | Make | Speed | DCV |
|---|---|---|---|---|
| 1 | 500 | G. E. | 1200 | 600 |
| 1 | 300 | G. E. | 1200 | 600 |
| 1 | 300 | G. E. | 1200 | 275 |
| 2 | 175 | G. E. | 1200 | 275 |
| 1 | 75 | G. E. 8( Ph.) | 1200 | 275 |

WE BUY—SELL—RENT

## REBUILT ELECTRICAL MACHINERY

**M-G SETS — ROTARIES**

3 ph. 60 cy.

800 KW West. 580 v.—710 HP 1200 r. Syn.
450 KW G. E. 575 v.—2300 v. Syn., 720 RPM.
300 KW G.E. Rotary 275 v. with 3-110 KVA 2300/4000 v. Transformers and control.
250 KW West. SK 250 v. 2300 v. Syn., 1200 Rev.
100 KW West. SK 275 v.—148 † 2/2250/440/2300 v.
50 KW G.E. 250 v.—70 HP Syn. 230/440 v.

**A. C. MOTORS**

600 † G.E. MT612, 2300/3/60, 450 Rev. S.R.
300 † HP, West. CW 2300/3/60 600 RPM S.R.
200 HP, G.E. 1 M 2300/3/60 450 RPM S.R.
150 HP, G.E. KT 220/440 v. 695 RPM.
150 HP, G.E. Type 1 K 2300/3/60 600 RPM S.C.
150 HP, G.E. Syn. 220/440/2/60 600 RPM.
100 HP, West. CS 220/440/3/60 500 RPM S.C.
100 HP G.E. 1M 440/220/3/60 480 RPM S.R.
75 † G.E. FTC—220/440—600 Rev. S.R.
50 † Allis-Ch. 220/440—1200 Rev. S.C.

**D. C. MOTORS & GENERATORS**

50 † West. 211SR., 230 v., 1750 Rev.
75 HP, West. SK, 153, 230 v. 1150 RPM.
60 KW West. SK 250 v. 1200 RPM Gen.
30 HP, West. SK 50, 230 v., 1750 RPM.
150 KW Triumph 250 v. 600 RPM Gen.
150 KW G.E. 550 v. RC 1150 RPM Gen.
125 KW West. SK 250 v., 600 RPM Gen.
100 KW West. SK 250 v., 600 RPM Gen.

**TRANSFORMERS**

6—75 KVA G.E. 2300 v.—115/230 v.
6—75 KVA G.E. 2300 v. Prim 240/480 v. Sec.

**DIESEL ENG. GENERATOR SETS**

100 KW 250 v. 1200 Rev.—Superior 6-cyl., late type.
200 KW 250 v. 1200 Rev.—Gen. Motors 8-cyl.

**LOCOMOTIVES**

23/25 T.G.E. 300 V. 42/44", NM824.

30 ton Jeff. 250 v. 36/42" Ga. MH 110 Motors.
6 ton Goodman 500 v. 42/44" Ga. 9104CS.
8 ton Goodman 250 v. 42/44" Ga. 9106CS.
8 ton Wenzh. 500 v. 36" late type.
6 ton West. 250 v. 904 Motors 36" Ga.
2 8 ton Goodman 250 B 500 v. 42" Ga. Cath.
2 4 ton Goodman, 250 v., 42" Ga. sgl. motor, gath.

**STORAGE BATTERY LOCOMOTIVES**

6 ton GE, Permissible BB Motors, 36/42" Ga.
5 ton Ironton 42" ga. Type D. low type.

**MINING MACHINES**

5—8SR Jeff, 250 V. permissible.
3—9SBB Jeff. 500 v. permissible, late type.
1—512 Goodman 50 † A.C. 220/3/60 perm.
1—1303 Goodman 220/3/60 open.

**HOISTS, CRANES AND PUMPS**

300 H.P. Lidg., fixed drum, 6' dia. 1¼" rope.

75 HP Mead Morrison sgl. fr. drum—AC Motor.
1 50/75 HP 2 drum Meade Morrison slope.
80 HP Hoyt & Patterson sgl. fixed drum, 4' dia.

*PROMPT SHIPMENT ON ALL SIZES A. C. AND D. C. REBUILT MOTORS.*

## MOORHEAD ELECTRICAL MACHINERY CO.

Noblestown Road, OAKDALE, PA.
*Pittsburgh District*

Pittsburgh { Walnut 1-4300
Tel. Exchange { Walnut 1-4301

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**Mine and Slope Hoists**

1—20,000# Dbl. Drum Mundy, w/o motor
1—26,000# Nordberg Sgl. Drum
1—10,000# Nordberg Sgl. Drum AC
1—17,000# Ottumwa Sgl. Drum AC
1—11,000# Ottumwa Sgl. Drum AC
1—16,000# Allis Chalmers Sgl. Drum
1—30,000# Allis Chalmers Dbl. Drum AC
1—7,000# Flory Sgl. Drum AC

**Crushers and Screens**

1—12x16 Eagle Dbl. Roll
1—18x20 Eagle Dbl. Roll
1—3B American Pulverizer
2—24x20 Jeff. Flextooth
1—Superior McCully 8" Gyratory
1—30x36 S.A. Ring type Knittel (new)
2—4x10 S.A. Vibrating Screens
4—Tyler Vibrating Screens

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2—4 Ton Westinghouse Ball Bearing
4—Drill Trucks on Rubber 220 Volts A.C.
3—Goodman Caterpillar Trucks 220 Volts A.C.
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2—6 ton Goodman ball-bearing locomotives, 36" gauge, type 23-AO47.
1—6 ton Goodman ball bearing locomotive, 42" gauge, type 23-AO-47.
1—6 ton Westinghouse locomotive, 36" gauge, Class 4-2-23-C-437.
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1—4 ton Whitcomb Battery locomotive, 36" gauge.
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4—CL85, AC, 3 phase, 60 cycle, 220 volt, Sullivan longwall mining machines.
1—Jeffrey Shortwall Mining Machine, 35 HB, AC, 6' cutter bar complete with tip bars track, cable and steel.
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2—Sullivan Longwall Mining Machines, type CH8, 2/60/220 volts, 36" cutter bars.
1—Sullivan shearing machine, class CH 11 AC.
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9—Goodman Standard mining machines, 50 HAP, 2/60/220 volts, 42" gauge.

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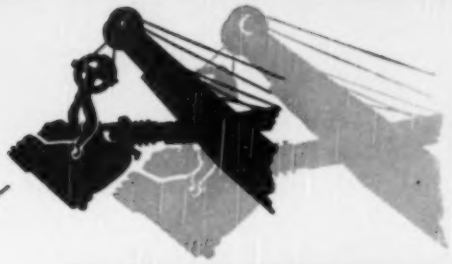

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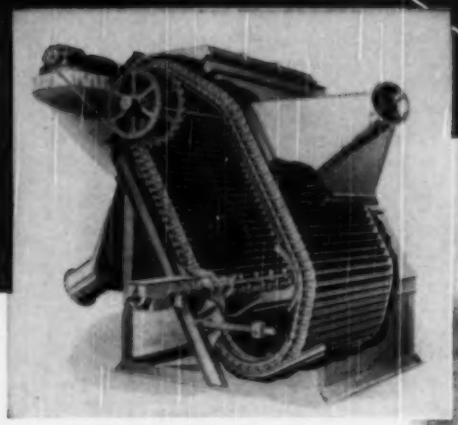
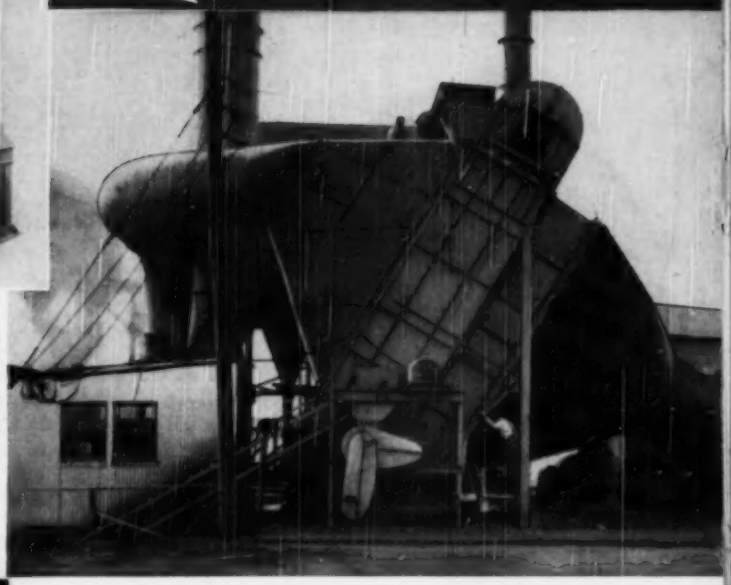
# HEAT DRYING FINE COAL at a Profit!





At a Southern Illinois mine, this Link-Belt drying plant (right) was built especially to recover and convert sludge, that formerly had been wasted, into powdered fuel for utility power plants. The Multi-Louvre Dryer (above) handles 35 tons per hour, and reduces surface moisture from 12% to 1% — AT A PROFIT.

## *A few Typical Installations*

- **SOUTHERN ILLINOIS**
  35 T.P.H. of ¼" x 0" handled in a single unit, reducing total moisture from 20% to 9%.
- **EASTERN KENTUCKY**
  Two units handle a total of 110 T.P.H. of ¼" x 0". Moisture reduced from 15% to 3%.
- **WEST VIRGINIA**
  Two units, each with a capacity of 36 T.P.H., dry ⅜" x 0" coal. Moisture reduction from 8% to 3½%.
- **EASTERN KENTUCKY**
  Two units handle 38 T.P.H. in each dryer. 16% moisture reduced to 3%.

## Excellent Results on Many Types of Coal

The Multi-Louvre Dryer design permits flow of drying gases through the system at low velocities, resulting in low power requirements and minimum degradation. Often it is practical to use the fines from dust collectors as fuel for the dryer furnace.

Link-Belt engineers can be helpful in solving your drying problems — regardless of coal seam or particle size — whether for recovery of waste, or as part of new or existing plants. Ask them — and ask for Book No. 2209.

**LINK-BELT COMPANY**

11.A08

Chicago 9, Philadelphia 40, Pittsburgh 13, Wilkes-Barre, Huntington 9, W. Va., Louisville 2, Denver 2, Kansas City 8, Mo., Cleveland 15, Indianapolis 6, Detroit 4, Birmingham 3, St. Louis 1, Seattle 4, Toronto 8.

**COAL PREPARATION AND HANDLING EQUIPMENT**

**Engineered and Built *by* LINK-BELT**